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THIRD SERIES FOUNDED BY EDWARD JACKSON

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For Use in the Removal of Lens Residue and Substance, Irrigation Following Hemorrhage, and in Conjunction with Removal of Soft, Traumatic or Congenital Cataracts

E-4882 Syringe, Two-way, FUCHS: with two side opening canulas, one each E-4885 and E-4886. Designed by Dr. Fuchs of Stuttgart, Germany, and introduced in the United States at the International Congress of Ophthalmology, New York, 1954. Presented at the 1958 Meeting of the American Academy of Ophthalmology and Otolaryngology by Dr. Louis Daily.

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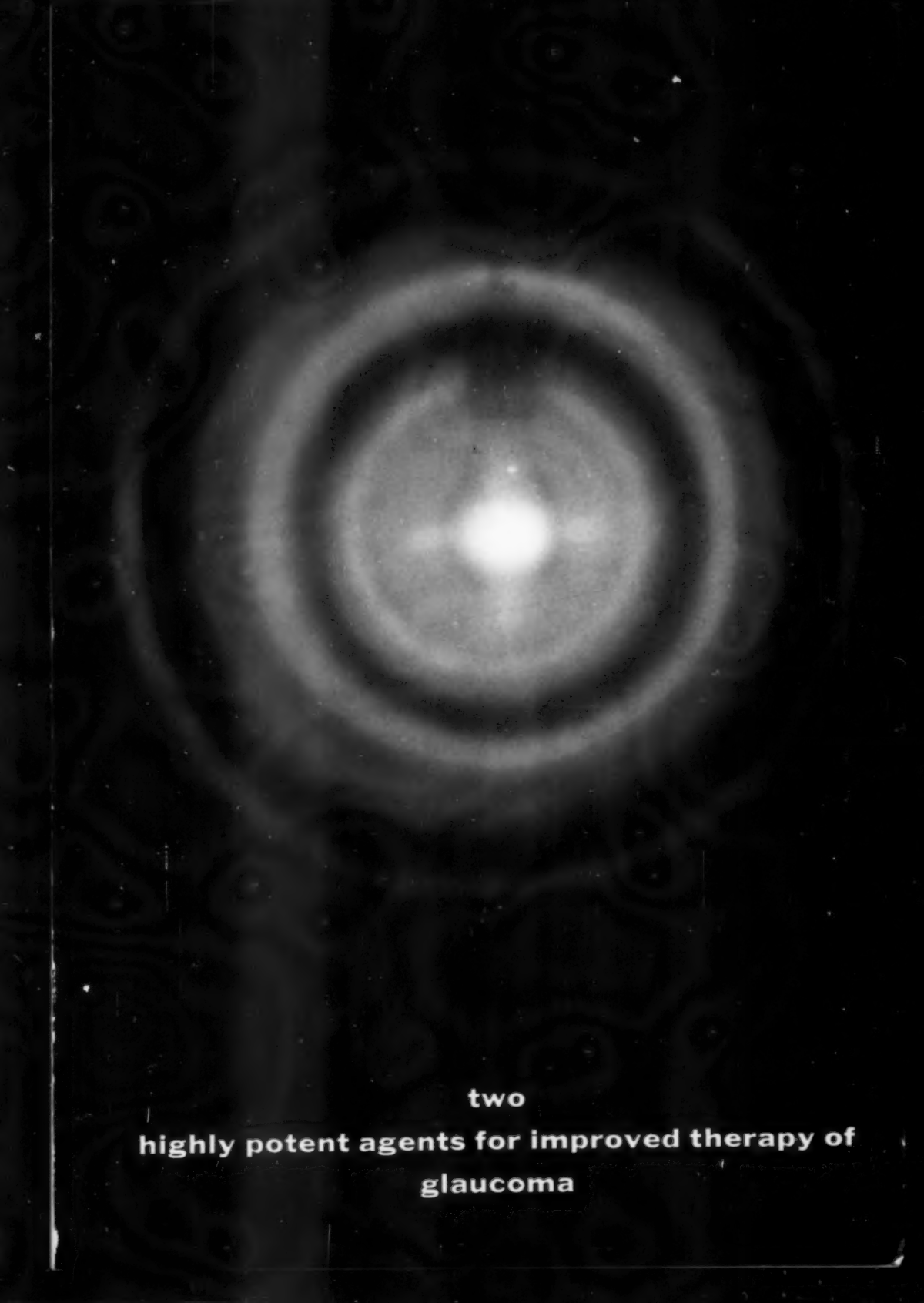
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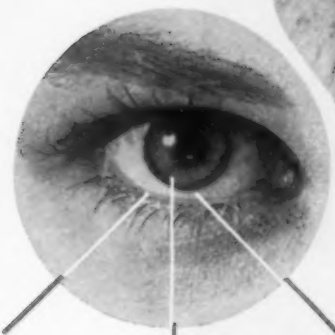

common "outer eye" disorders

allergic

(allergic blepharitis, allergic conjunctivitis, episcleritis)

inflammatory

(acute catarrhal conjunctivitis, ulceration, meibomitis, keratitis)

traumatic

(foreign bodies, burns, abrasions, lacerations)

consistently respond to topical therapy with

METIMYD®

ophthalmic suspension

prednisolone 0.5% plus sulfacetamide sodium 10%

ointment with neomycin 0.25%

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The BALANCED SALT SOLUTION, ALCON, which is furnished as a diluent and for lavage purposes, "offers less cytotoxic effect to the intraocular tissues than does normal saline diluent."[1] "It has been recently demonstrated that frequent irrigation with saline results in swelling of the corneal stroma from alteration of the mucopolysaccharides of the cornea."[2]

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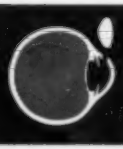
[1]Girard, Louis J., and Neely, Wanda: "The Evaluation of Zolyse in Cataract Extraction", Research Report No. 11, Alcon Laboratories, Inc., 1959.

[2]Boyd, Benjamin F.: Enzymatic Zonulysis, Highlights of Ophth., vol. III, no. 4, pg. 70, 1959.



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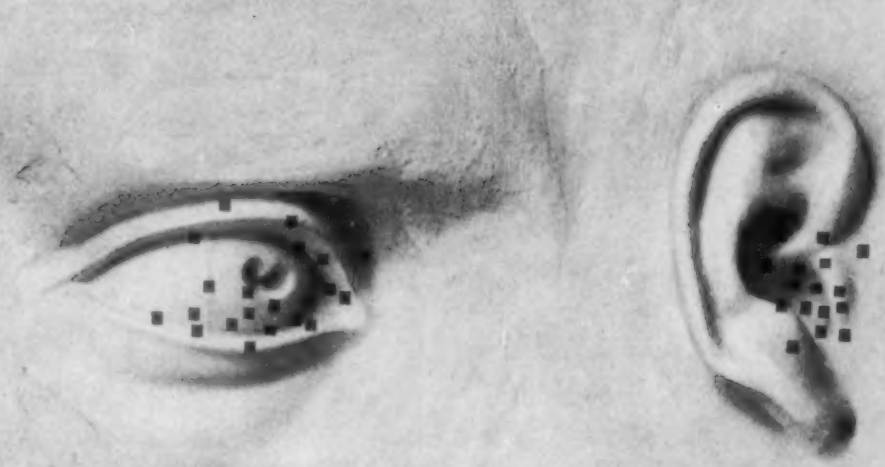
FORT WORTH, TEXAS

IF INFECTION IS PRESENT OR PROBABLE



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Tubes of 5 Gm. and 15 Gm.

CREAM AND OINTMENT

*Baer, R. L., and Witten, V. H.: Editorial Comment. *In* The Year Book of Dermatology and Syphilology (1958-1959 Year Book Series), Edited by Rudolph L. Baer and Victor H. Witten, Chicago, The Year Book Publishers, 1959, p. 40.

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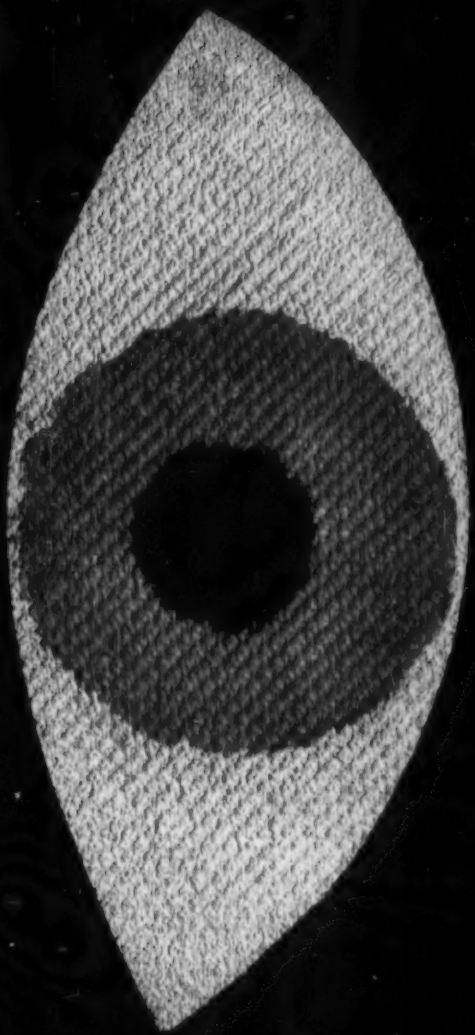
References: (1) Perkins, E. S.: **Practitioner 178**:575, 1957. (2) Queries and Minor Notes, **J.A.M.A. 161**:1032, 1956. (3) Smith, C. H.: **Eye, Ear, Nose & Throat Month. 34**:580, 1955. (4) Blakiston's New Gould Medical Dictionary, ed. 2, New York, McGraw-Hill Book Company, Inc., 1956, p. 945. (5) Ostler, H. B., & Braley, A. E.: **J. Iowa M. Soc. 44**:427, 1954.



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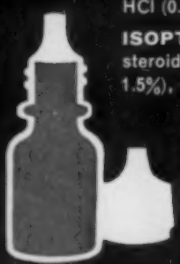

ISOPTO® P-N-P for common, mildly inflammatory, external ocular infections; contains Polymyxin B Sulfate (16,250 units/cc.), Neomycin Sulfate (5 mg./cc.), Phenylephrine HCl (0.12%), and Methylcellulose (0.5%).

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the corticosteroid that hits the disease, but spares the patient

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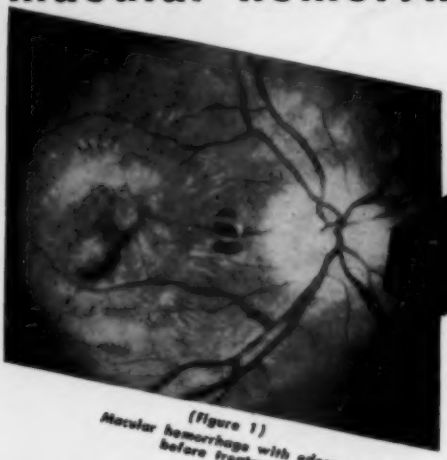
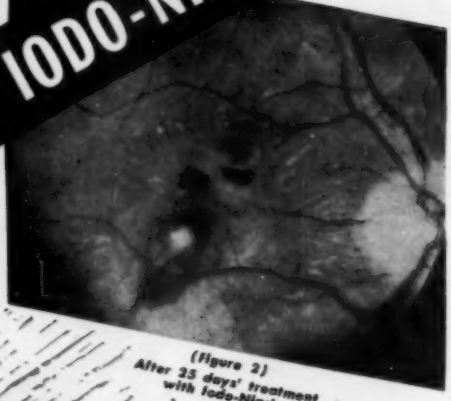
macular hemorrhages

respond to

IODO-NIACIN*



(Figure 1)
Macular hemorrhage with edema, before treatment



(Figure 2)
After 25 days' treatment with Iodo-Niacin

NO IODISM

Macular and retinal hemorrhages are satisfactorily absorbed after use of IODO-NIACIN[1]. The dosage used in this study was 1 tablet three times daily.

In cases of cerebral and generalized arteriosclerosis, IODO-NIACIN has been used with great benefit[3]. Full doses were given for a year or longer without any iodism or ill effects.

The formula of IODO-NIACIN Tablets contains potassium iodide 135 mg. (2¼ gr.) combined with niacinamide hydroiodide 25 mg. (⅜ gr.). IODO-NIACIN Ampuls 5 cc. are highly satisfactory for intramuscular or intravenous use[2].

Since the retina is intrinsically a part of the brain[4], hemorrhages in this region are indicative of a similar cerebral condition for which IODO-NIACIN is directly indicated.

IODO-NIACIN Tablets, slosol coated pink, are supplied in bottles of 100. Ampuls 5 cc. in boxes of 10.

1. *Am. J. Ophth.* 42:771, 1956.
2. *Am. J. Digest Dis.* 22:5, 1955.
3. *Med. Times* 84:741, 1956.
4. *Cecil's Textbook of Medicine*, 7th ed., 1947, p. 1398.

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Gantrisin Diethanolamine Ophthalmic Solution and Ointment contain 4% Gantrisin® – brand of sulfisoxazole.
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No aphakic patient of yours need

WHEN you're ready to write a prescription for a post-operative cataract patient, you've reached a primary objective—the formula for materials for reinstatement of his vision.

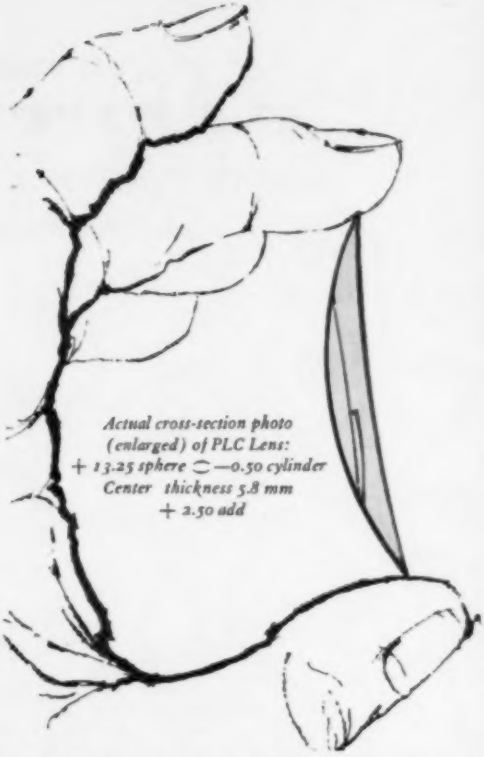
Yet, at this stage a patient's welfare may be far from secure. New considerations become primary. There is the quality of the vision the lenses will provide. There is the weight of the lenses—sometimes quite a shock to the newly aphakic.

But perhaps most important of all is the frame of mind that creeps over the patient as he comes to realize that his new glasses mark his special condition conspicuously.

This need not be the case. Today's cataract patient can wear glasses which seem very little different from those of others who wear strong corrections. These are glasses fitted with Panoptik Fused Lenticular Cataract lenses by Bausch & Lomb.

THE LENS WITH THE CONTINUOUS FRONT CURVE

The bulging front curve of a traditional strong convex cataract lens gathers highlights and shadows, adds thickness and weight. With a sharp departure in design, the Panoptik Lenticular Cataract lens is made from three pieces of glass fused together and finished in a single curve across the entire front. There is no protrusion in the lenticular area. As a result, evidence of this area is greatly reduced. Viewed from side angles, the lenticular field disappears, a fact which holds true for the reading segment as well.



Thickness is greatly reduced at the center—and correspondingly, weight is reduced. This is a thinner, flatter, lighter lens.

ADVANCED GLASS PROCESS MAKES PLC POSSIBLE

Modern lens design employs high index barium crown glass to do much of the job formerly de-

Panoptik Fused Lenticular

worry about his appearance

pendent on surface curvatures. The reading segment and lenticular field of PLC lenses are made from this glass. The low-power outside portion, or carrier, is an area through which large objects and movements on the side can be detected.

The three major pieces, the carrier, lenticular field, and reading segment, are produced by a highly advanced process involving the use of "continuous flow" automatic furnaces. Chief technological advance lies in platinum-lined "miracle" chambers which hold the glass at critical temperatures through melting and fining. Not until research and engineering developed this process was it possible for Bausch & Lomb to obtain the necessary optical quality to make this lens practical in commercial quantities.

LATITUDE IN POWER RANGE, IN SEGMENT LOCATION; EASY TO PRESCRIBE AND FIT

Probably one of the most direct and immediate benefits to the doctor is PLC's adaptability in power range and segment placement to almost any cataract need. It is a satisfaction to prescribe.

The doctor rests assured that fitting will be perfect because the optical centers are easy to locate where they belong, and the distance field has all the diameter required, between 28 and 33mm. The Panoptik shape of the reading segment is wide at the top with rounded corners conforming to natural reading habits.

In certain cases where an adjustment of the original prescription may be necessary, the original lenses can be resurfaced, because the reading segment is located between the carrier and the lenticular field. Optically, image jump, marginal astigmatism and chromatic aberration are minimized. Panoptik Lenticular Cataract is a lens of maximum optical capacity.

Next to the aphakic patient's desire to see is his desire not to be conspicuous by virtue of his handicap. The Panoptik Fused Lenticular Cataract not only gives him vision at its best, it offers its own additional and exclusive measure of cosmetic advantage and physical comfort.

Every cataract patient deserves these benefits. PLC may be prescribed in white or Soft-Lite. Available always in full power range from any supplier of Bausch & Lomb ophthalmic materials.

For your own examination, and for help in explaining lens function to patients, an actual cross-section sample of a Panoptik Fused Lenticular Cataract lens is yours for the asking. Simply write Bausch & Lomb, or mail the coupon below. (For a limited time only.)

Cataract Lens

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Sirs: Please send, without obligation, one of your sample cross-section PLC lenses.

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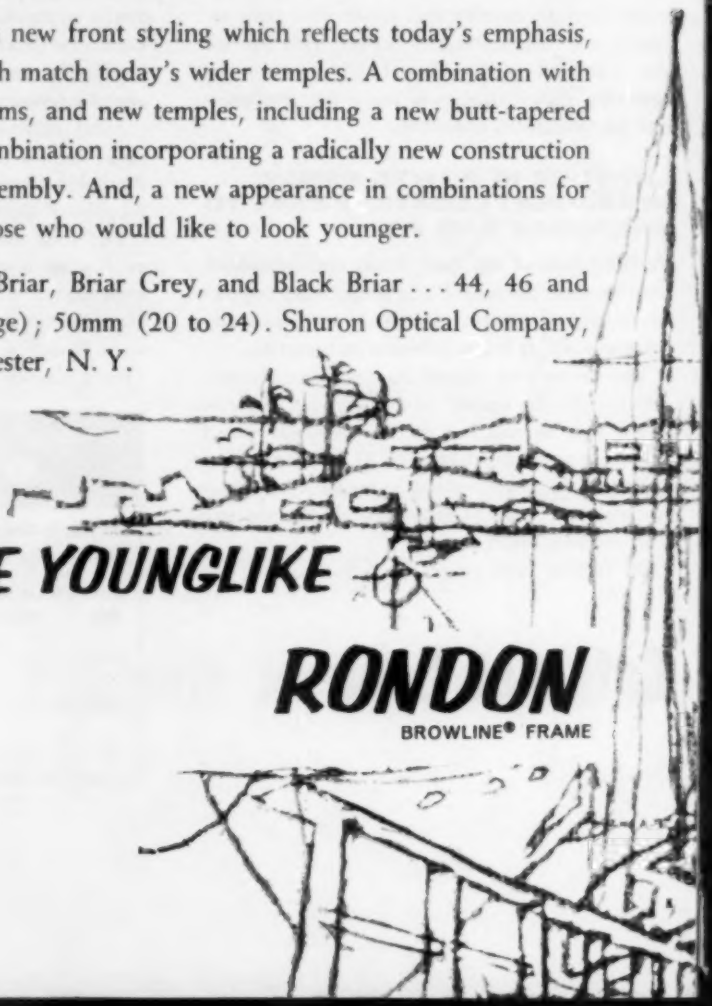

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FAST enough to stop two heartbeats

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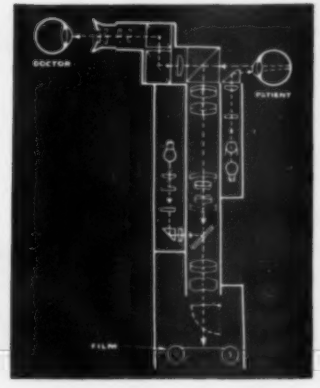
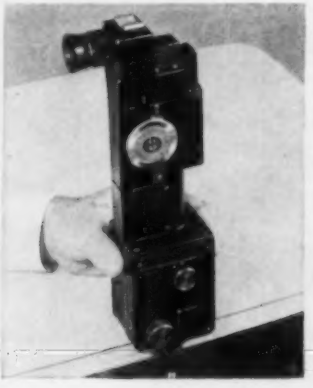
The complete package includes: Precision camera unit, power pack unit, foot switch and accessory eyepieces... all in a sturdy, fitted carrying case... ready for instant use.





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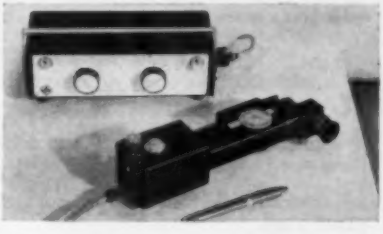

Dept. V253

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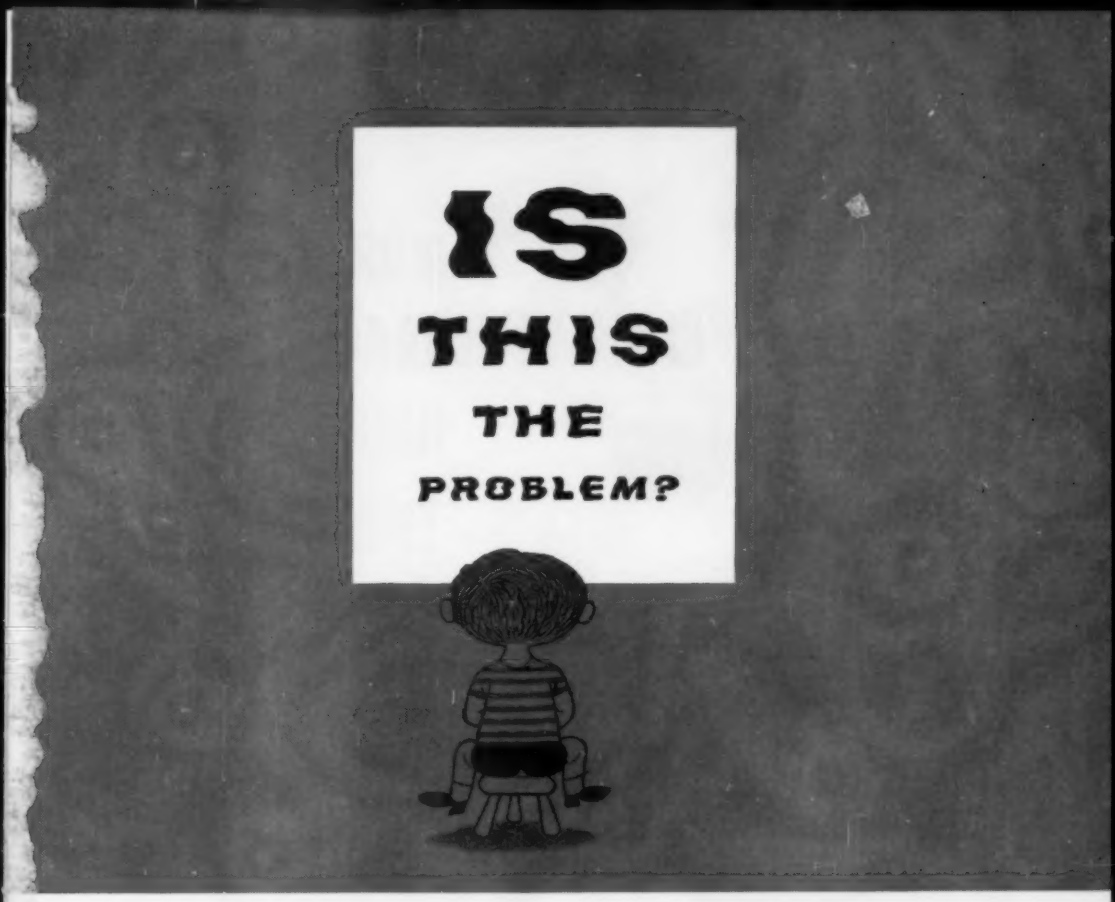

Irregular astigmatism, keratoconus, or aberrations of the corneal surface are conditions which will not allow patients to see things as they really are. The variations in curvature of the front surface of the cornea will refract light to different distances and in different directions. The spectacle lens will do very little to correct the irregular refraction of light by the cornea. Something is necessary to regularize the curvatures of the cornea. Proper fitting of a contact lens will take care of these conditions which are otherwise uncorrectable by any other means.

Uncorrected, the anterior and posterior surfaces of the precorneal fluid will conform to the surface of the cornea and maintain the irregular curvatures. With application of a contact lens, the front surface of the precorneal fluid conforms to the regular surface of the contact lens, thereby creating a spherical eye out of an originally distorted curvature.

In this way, patients with conditions which are often thought to be hopeless, can once again resume their work in a normal world with normal vision.

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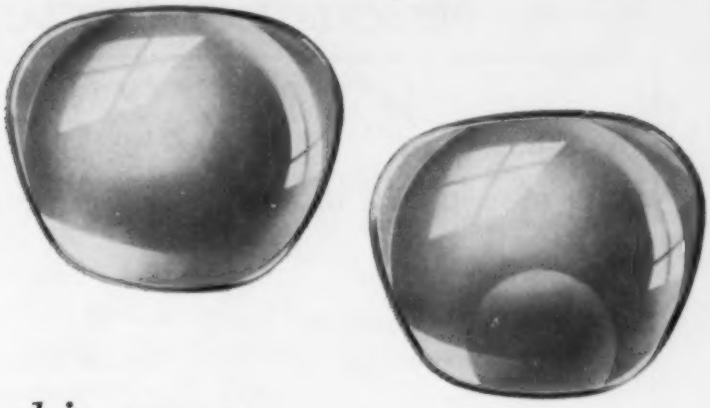

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ANISEIKONIA*

WITH NOTES ON THE JACKSON-LANCASTER CONTROVERSY

THE XV JACKSON MEMORIAL LECTURE

ARTHUR LINKSZ, M.D.
New York

I ARRIVED in this country in January, 1939, and here I stand, not quite 20 years later, honored beyond my expectations, and certainly beyond my merits, delivering the XV Edward Jackson Memorial Lecture. These have been wonderful years—the best years of my life. I cannot help but feel humble and thankful at this, for me, so great a moment.

The first recipients of this great honor were intimates and collaborators of Edward Jackson. The main subject of their lectures was the personality and the achievements of that great American ophthalmologist, his many faceted literary, organizational, education and scientific work. Later lecturers often but invoked his name like one says grace at a festive occasion, presenting, in the main, some important aspect of their own scientific endeavor. I cannot follow either pattern. I can say little that is personal about Edward Jackson—though his work I know intimately—and as far as scientific achievement is concerned, I have precious little to offer. Experimental investigation, nowadays, is more and more in the hands of full-time medical investigators. Rare are the Duke-Elders, Friedenwalds and Goldmanns who excel in clinical medicine while still measuring up to the level of these professionals. Surely, I am not one of them. Experimental medical investigation requires time of which I, a practitioner, have little, and facilities, a research staff, an organization and, most of all, an endowment. Heaven knows, I never had much luck in joining, building or mustering any. There is, I feel, only one justification for my standing here today—my endeavors as a teacher of applied physiologic optics. Edward Jackson was, among many things, a teacher, especially a teacher of practical physiologic optics, and being an enthusiastic teacher, he used every occasion to impart knowledge. He attended hundreds of meetings. He spoke not only before the great national organizations; no local medical or ophthalmological society was too small for him. Reading in his papers one constantly has the feeling that their main purpose was didactic. He wanted to share his know-how; he wanted to make others better practitioners of the art he had first taught himself to master.

His papers, especially his editorials, are little masterpieces of clarity and readability, easily understandable. He was especially interested in the technique of clinical examination and the tools used for this purpose. His most celebrated invention, the cross cylinder, is a tool to simplify and expedite clinical refraction. He was a shrewd observer of psychology, intensely interested in the reactions of both patient and doctor. A

* From the Manhattan Eye, Ear and Throat Hospital. Presented at the 63rd annual session of the American Academy of Ophthalmology and Otolaryngology, October 12-17, 1958, Chicago.

cross cylinder in the form of the Stokes lens was known before Jackson's time. He noted that patients react poorly to the slow increases of cylinder power introduced by the turning of this lens and that they react faster to sudden changes. He modified the Stokes lens accordingly. He was not even aware that he had invented something new—a new and important tool. His first description of the cross cylinder (he first called it an "astigmic lens") is hidden in a paper in which he suggested the proper selection of lenses for the trial case. Only much later did he publish papers on the principle and the application of the cross cylinder. By the way, Jackson earned his first academic degree in engineering, and all his life he happily coupled the mind of an engineer with that of a biologist.

I came to a meeting of this great academy for the first time in October, 1941, in the third year of my life in America. I use the adjective "great" deliberately. I have been in many countries, to many meetings, and I still have to see anything to equal this institution which offers the concentrated effort of the best brains in our profession to better the work of their colleagues and, especially, of their juniors. In fact, it is this unique characteristic of our academy which makes it the proper vehicle for an Edward Jackson Memorial Lecture. After Dr. Jackson's death, the heads of this organization searched for some means to honor his memory. Many suggestions were made and finally a memorial lecture was found the most appropriate. Dr. Lawrence T. Post, announcing the establishment of this lecture in an editorial in the *Transactions*, especially emphasized that lecturers be "selecting subjects particularly appropriate to the young man," all because of Dr. Jackson's "special interest in the instruction of young men and his life-long endeavor to inculcate in them an interest in research."

As I have said, I attended the meeting of this academy for the first time in October 1941. My great friend and benefactor, Dr. Walter Lancaster, who not long before had become my chief at the Dartmouth Eye Institute, invited me on a guided tour through the extended facilities of this meeting, which at that time were as strange to me as they have now become familiar. I remember every detail of those few minutes. We came down from Dr. Lancaster's room to this floor and walked toward the steps which lead to the gate of the commercial exhibits. Hardly had we passed the gate when (what a coincidence!) a little, very old, almost grotesque man, with old-fashioned wing collar, came toward us. Dr. Lancaster, tall, erect, handsome, himself nearly eighty years old, greeted him with unusual reverence, and then I heard him say: "Dr. Jackson, may I introduce Dr. Linksz." They exchanged a few words and parted. "Was this, by any chance, *Edward* Jackson, the inventor of the cross cylinder?" I asked. I confess, I was confused. I was never too good on dates but I knew that this invention by the great Edward Jackson went back to the 1880's, a time long before I was born. And I also knew that the editor of the AMERICAN JOURNAL OF OPHTHALMOLOGY (the only magazine in the English language to which the Eye Clinic in Budapest subscribed and which I had been reading regularly for some time, even before I came to this country) was also an Edward Jackson. But that the two could be the same never occurred to me; maybe they were father and son, I sometimes thought. On top of it, I could not even tell whether this little old man with the wing collar was *either* of the Jacksons I knew about. In any event, I am still one of those Jackson Memorial lecturers who can say: I knew Dr. Jackson personally. It was the only time I ever saw him.

The next spring, that of the year 1942, was a period of great activity at the Dartmouth Eye Institute. Dr. Lancaster and Dr. Burian prepared for the meeting of the American Ophthalmological Society, at which aniseikonia was going to be discussed by no lesser man than Edward Jackson. It

was at that meeting that Dr. Lancaster read one of his most precious papers, "A reply to criticisms of aniseikonia." And, as it turned out, it was at that meeting that Dr. Jackson read his last paper.

There is a span of exactly 60 years between Jackson's first paper and his last. The first one was a comparative study of the action of several mydriatic alkaloids, read before the Pennsylvania State Medical Society in 1882. The last was the one I just mentioned. Its title was "Practical importance of aniseikonia." However, that meeting was not the last one Dr. Jackson attended. He still participated, and actively, in the October, 1942, meeting of this, his beloved Academy. Two weeks later he died, in his 87th year. Like all those blessed and chosen by the Lord, he kept on going and working, in full possession of mental and physical capacities until the very end. His faithful Friday, Dr. William Crisp, gave a moving account of his last days in the leading paper of the AMERICAN JOURNAL OF OPHTHALMOLOGY of January, 1943: "Edward Jackson, student and teacher." Dr. Crisp, was properly chosen to deliver the first Edward Jackson Memorial Lecture; his other friend, the unforgettable Dr. Harry Gradle, gave the second.

The number of papers Jackson published within the span of the 60 years between 1882 and 1942 runs to more than 600. This information I have from Dr. William Bane of Denver, a friend and collaborator of Dr. Jackson's and owner of the best collection of his publications. Through the good offices of Dr. Ralph Danielson, also of Denver, I had access to this unique collection. It would have been almost impossible otherwise to become acquainted with the earlier work of Dr. Jackson. I want to express my thanks here publicly to both of these distinguished gentlemen whom I proudly call my friends and who, having been friends of Dr. Jackson, brought me as close to him as if I had known him intimately. The stories, anecdotes, sayings I collected listening to them would make a good lecture. I hope one day they can be prevailed upon to publish this precious lore.

Jackson's first and last papers, in an almost symbolic manner, show his life-long preoccupation with problems of precise refraction, and in speaking today of "aniseikonia," I actually speak only of another factor adding to the precision of refraction, another factor which, in properly chosen cases, helps in relieving eyestrain.

The problem of eyestrain occupied Dr. Jackson almost from the beginning of his career. I am quite sure I cannot spend my time, and yours, better than by quoting what really are pearls of wisdom from his writings about this very subject. Here are two quotations from a lecture Dr. Jackson delivered at the Philadelphia Polyclinic in 1909. The first one reads as follows:

> Those who do not suffer from their ametropia do not come to us for relief. Those who do come do not endure with comfort the strain which an error of refraction imposes. The same error of refraction which will cause in one person no discomfort whatever will produce in another continuous aching of the eyes and head, in a third terrific paroxysms of sick headache, in a fourth conjunctivitis, in a fifth chronic inflammation of the lid margins, and in a sixth, disturbances of digestion and general nutrition.

What wise words, and how true also of aniseikonia, a condition which, to paraphrase Jackson, some "do not endure with comfort," while others do, and "those who do not suffer from it do not come to us for relief."

And here is a second quotation:

> The low and moderate degrees of ametropia are more likely to cause chronic and obstinate headaches and other forms of nervous disorder than are the higher degrees of ametropia.

How true again and how well applicable, as I shall try to show, to the problem of aniseikonia. Jackson described in this paper the case of a physician suffering from "dizziness and nervous dispepsia," relieved by the constant wearing of

R: +0.37D. sph. ⌒ +0.25 D. cyl.
L: +0.25D. sph.

This patient tried on two occasions within four years to leave off his distance correction and each time, Jackson writes, "there was suddenly increasing dizziness and disturbance of digestion which passed away with the renewed wearing of the correcting lenses."

Jackson was much intrigued by the problem of anisometropia as a source of eyestrain. I shall quote several passages from one of his still earlier papers on "The correction of anisometropia" (1896), because I think they are even more pertinent.

> Anisometropia, like ametropia, in general, makes trouble either by preventing perfect vision, or by making it difficult to attain, *so that the benefit of it is only secured at the cost of eye-strain.* And as with the various forms of ametropia, it is in the higher degrees and in later life, that it entails imperfect vision; *and in the lower degrees and earlier in life that it causes eye-strain.*

Ametropia, anisometropia and, we may add, aniseikonia behave very much in the same manner. It is (to paraphrase Jackson once more) in the higher degrees and in later life that aniseikonia entails imperfect *binocular* vision, but it is in the lower degrees and earlier in life that it causes eyestrain. Monocular aphakia is the most outstanding case in point. Spaeth, in a lecture before the Oxford Ophthalmological Congress in 1957, stated that in monocular aphakia when corrected by contact lens, aniseikonia of five and more percent was found to be of no significance. He was certainly justified in making this statement. This large amount of aniseikonia (which by the very nature of things is usually encountered later in life) entails imperfect binocular vision only, not discomfort. As such, it is of no significance. But it would be erroneous to conclude, as several other authors implied, that lesser amounts of aniseikonia are of even lesser significance. It is, to use Jackson's wording, "in the lower degrees and earlier in life that it causes eye-strain."

Here is another quotation from Jackson's paper which stresses this very point.

> Where in one eye the ametropia is of such low degree as not to entail eye-strain, while the difference of refraction between the two eyes is so great as to preclude the focusing of both together upon the same object, *the patient will not suffer from eye-strain.* If however the second eye presents ametropia of low degree, distinctly differing in kind and degree from the ametropia of the first eye, symptoms of eye-strain are very liable to develop.

The case for the importance of aniseikonia could not have been stated in better terms. Obviously, in the first type of case, binocular vision will often be absent or, if present, rudimentary, and though the images in the two eyes, physically, are unequal, "the patient will not suffer from eye-strain." Aniseikonia, in this case, will be of no consequence. I give an example of such a case:

O.D. -6.0D. sph. $\bigcirc$ -1.0D. cyl. ax. 170°
O.S. -0.75D sph.

Right retinal image smaller by five percent.

This was a young woman who thought one *must* have binocular vision. She had practiced eye exercises for a long time and I tried to dissuade her from having anything further done. She had a compulsive neurosis, as had her parents, about binocular vision and fusion but she had no eyestrain.

Spaeth's, Constantine and McLean's, Goar's and my own cases of monocular aphakia corrected by contact lens and having a residual aniseikonia of five to eight percent also are good examples to prove the correctness of Jackson's statement, and still better examples are Jackson's two patients with unilateral aphakia corrected with regular spectacle lenses, who also had no discomfort. Jackson gave their refractive correction and visual acuity as follows:

(1) O.D., $+11.0$D. sph. $\bigcirc$ -1.37D. cyl. ax. $68° = 24/20$
O.S., -4.0D. sph. $\bigcirc$ -1.12D. cyl. ax. $80° = 20/40$
(2) O.D., $+2.25$D. sph. $\bigcirc$ -0.50D. cyl. ax. $84° = 1.2$
O.S., $+11.0$D. sph. $\bigcirc$ -2.5D. cyl. ax. $125° = 1.3$

and he added, "But no insurmountable difficulty from aniseikonia has been encountered after such correction."

People blessed with suppression have no trouble even if retinal image size difference runs in the neighborhood of 30 percent, as it must have in Jackson's cases. On the contrary, symptoms of eyestrain are "very liable to develop" if the ametropia of both eyes is of low degree and that of the second eye "distinctly differing in kind and degree from the ametropia of the first eye." Patients with this type of anisometropia ordinarily are under the compulsion to fuse like emmetropes or iso-ametropes, since their retinal images are not sufficiently unequal. Whether we call the cause of this discomfort anisometropia or aniseikonia or even anisophoria does not really matter. They *do* have ocular discomfort. They *do* experience eyestrain. We can take Jackson's word for it. Here is an example; a young salesman with a long history of severe eyestrain, with the following correction:

O.D., -0.5D. sph. $\bigcirc$ -0.5D. cyl. ax. 85°
O.S., $+1.0$D. sph. $\bigcirc$ -0.25D. cyl. ax. 175°

The image of the right eye was smaller by 1.5 percent, and its correction brought relief. Or this other similar case:

O.D., -1.5D. sph.
O.S., $+0.87$D. sph. $\bigcirc$ -0.37D. cyl. ax. 105°

in which the image of the right eye was smaller by 2.75 percent and only its correction made comfortable vision possible.

The proper limits for the full correction of anisometropia are, Jackson asserted, to some extent determined by the limits of the normal power of unequal accommodation, which he assumed to be 1.0D. or at the most 1.5D. However, Jackson correct'y found this to be only a minor factor. Another important factor, possibly *the* most important factor, which determines whether or not binocular full correction in anisometropia is feasible is, according to Jackson, the prismatic effect of the peripheral portion of the correcting lenses. More than 60 years ago Jackson clearly noted what now is common knowledge—the fact that whenever the visual axis does not pass through the optical center of a correcting lens, there is an apparent displacement of the object looked at.

Let me quote from the same paper once more:

> If the lenses differ in kind or strength, the apparent displacements of the point looked at will correspondingly differ; and in order to bring the impression of that point upon the fovea in each eye, the visual axes will need to be turned in somewhat different directions. The power to turn the visual axes in different directions varies in different individuals but is definitely limited in all. This limit is narrowest in the vertical direction. . . . Differences in the strength of the lenses used before the two eyes are commonly limited by the risk of producing vertical diplopia, or eye-strain *in the effort to avoid* vertical diplopia.

These wise words are worth stressing again. It is "the effort to avoid vertical diplopia" which causes eyestrain. This effort, of course, is not a conscious one. Fusion, if present, has the character of a compulsion. It is "the compulsion to fusion," if present and under undue stress, which causes eyestrain. Not the anisometropia as such, not the aniseikonia as such.

Once more I want to emphasize that this paper was written in 1896, four years before Hofmann and Bielschowsky published their famous study, "On the ocular fusion movements which are not subject to the will," and thus established these movements, the ocular movements we now generally call "vergence movements," as a separate entity. Jackson obviously referred to these same movements when he spoke of "the power to turn the visual axes in different directions." He clearly noted that this power is most limited in the vertical direction. He correctly stated that the difference in the necessary rotations of the eyes depends on the difference in lens power. He believed that in the vertical directions the eyes cannot usually

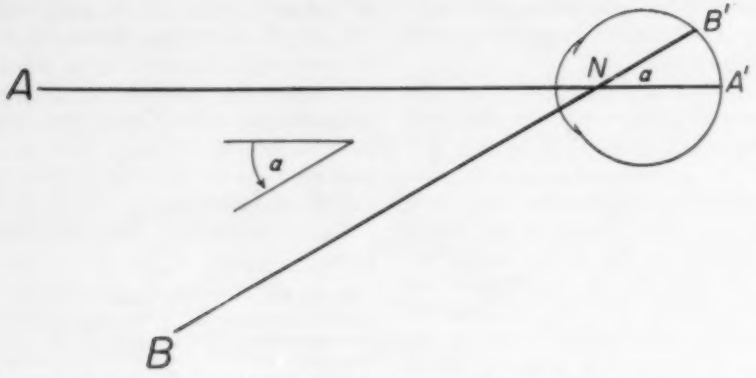

Fig. 1 (Linksz). Diagram showing relationship of corresponding points in an emmetropic eye.

overcome more than the differential prismatic effect of two diopters and he thought that this is generally the limit within which correction of anisometropia is tolerable.

Jackson recognized, by the way, that this problem of lens-induced forced vergence is related to the problem of unequal retinal images, which we now call aniseikonia. I quote again:

> What is commonly spoken of as the difference in size of the retinal images, produced by correcting lenses of different strengths, is simply a special instance of this unequal prismatic action in the peripheral portion of unequal lenses; and the confusion and eye-strain associated therewith come about, not by reason of the mere inequality of size of images, but through the difference of position of what should be corresponding points to which attention is directed.

This relationship is clearly shown in the following diagrams. It is seen in Figure 1 that if an emmetropic eye turns from looking at point A to gaze at a point B which is α degrees downward, it needs to turn α degrees. A hyperopic or aphakic eye, like the one shown in Figure 2, when corrected with a spectacle lens receives a larger retinal image. Now if the aphakic eye wants to change its gaze to look from point A to point B, it has to turn $\alpha +$ degrees. Let me repeat: The retinal image of the panorama from A to B subtends in the phakic eye α degrees; to carry the gaze from A to B this eye has to turn α degrees. In the spectacle-corrected aphakic eye, the panorama from A to B covers the larger retinal area of $\alpha +$ angular value. Thus, if this eye turns its gaze from A to B, it has to rotate through $\alpha +$ degrees. The circumstance in which some section AB of the panorama covers a retinal sector of α degrees in one eye and $\alpha +$ degrees in the other eye is called *aniseikonia*. The circumstance that in looking from A to B one eye moves through α degrees while the other has to move through $\alpha +$ degrees, I have previously called lens-induced vergence. I shall hardly have to take any of your time proving the fact that the two circumstances are the same. If Jackson was correct in stating that lens-induced vergence movements are the principal limiting factor in successful full correction of anisometropia, he might just as well have said that this limit is set by aniseikonia, by what Lancaster called abnormal aniseikonia, by the inequality of images frequently encountered in eyes with corrected unequal errors of refraction. Our great master, Edward Jackson, contradicted himself in this matter. Even if in his last paper Jackson tried to prove that aniseikonia of some 30 percent is, in an occasional case, well tolerated, his earlier writings on anisometropia and on eyestrain caused by anisometropia prove most convincingly that the differences in image size present a factor that is to be considered—

but only moderate differences in image size. Those two cases of Jackson's prove little, one way or the other. Those two patients with monocular aphakia were comfortable not because aniseikonia is of no consequence but because of good suppression. (I might add that the majority of monocular aphakics who cannot wear regular spectacles do not offer a proof to the contrary, namely, that aniseikonia *is* a matter of consequence. Aniseikonia is the least of the problems faced by these people. Unfortunately, it would lead me too far to analyze, here and now, *their* problems.)

Jackson, of course, did not know at the time of his earlier writings that in order to have unequal retinal images in one's two eyes, it is not a prerequisite to have anisometropia and to wear a correcting lens, as the case may be, before one or both eyes. The studies of Ames and his collaborators at Dartmouth were still a matter of the future. It is, as we know today, possible to have inequality of retinal images with binocular emmetropia or iso-ametropia, though these cases are rare and the aniseikonia will hardly ever be of more than moderate degree. It is thus possible for a patient to be faced with the problem of forced vergence and eyestrain even without having anisometropia corrected by lenses of unequal strength. Jackson also did not know at that time that it is feasible to change retinal image size and retinal image position in any desired direction without influencing the eye's refraction. He did not yet have our size lenses at his disposal. Jackson assumed, and he assumed it correctly, that lens-induced vergence movements limit the feasibility of full correction in anisometropia and are, in this condition, the principal cause of eyestrain. Today, we can go further and add that size lenses eliminate just this need for lens-induced vergence movements, and with it at least one cause of eyestrain.

I should probably clarify this point. A change in the size of the retinal image, for better or worse, will generally also change the angle through which that eye need rotate in order to cover a certain section of the panorama. I shall quote no lesser authority than Ogle on this point:

> When a lens which has an angular magnification of 2 percent relative to the center of rotation of the

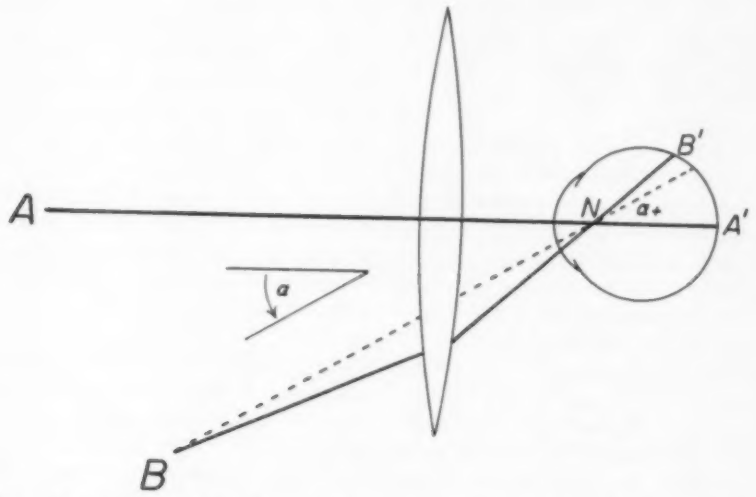

Fig. 2 (Linksz). Diagram showing effect of plus lens for correction of aphakia on retinal image size.

eye is placed before one eye, then, if the two eyes turn down to fixate a point 20 degrees below the axes of the lens, the eye with this lens before it must turn further by 2 percent of 20 degrees, or 0.4 degree, or 0.7Δ.

Similarly, if the retinal image in one eye is larger for some reason by, say two percent in one eye than in the other eye, then, as Jackson clearly saw, unequal oculorotations of the just-described magnitude will be necessary to cover equal sections of the panorama. However, in case a size lens of two percent magnification is placed before the second eye, not only is the image size difference corrected (which Jackson might have thought unimportant) but the necessity of the forced vergence movements (which Jackson thought to be the cause of eyestrain) is also eliminated. If lens-induced forced vergence movements in anisometropia are the cause of eyestrain—and Jackson believed that they are—then size lenses are certainly the most logical means to eliminate them.

I must, at this point, discuss the relationship of these vergence movements to a condition known as anisophoria. Friedenwald, some years earlier and also at that memorable meeting in 1942, introduced the consideration of this entity into the controversy about aniseikonia. Lancaster clearly showed in the paper I have mentioned that the use of the term in this connection was, to say the least, unfortunate. "Phoria" is the term we all use to designate the relative position of the visual axes when fusion is *suspended*. If a person with fusion suspended shows, for instance, orthophoria looking straight ahead and a right hyperphoria of 4.00 prism diopters in the reading position, then this person reveals incomitant eye movements, possibly a weakness of the right superior oblique muscle; in short, he reveals anisophoria. If he has good binocular vision and proper vergence power, he might continue to have binocular vision and fusion in both positions. He might also have eyestrain due to forced vergence movements, which in this case has nothing to do with unequal corrections or aniseikonia. Let me repeat: In real anisophoria the eyes have a tendency to go through unequal rotations but are forced to equalize them for the maintenance of binocular fusion. In corrected anisometropia with no anisophoria present, conditions will be quite the opposite. Here the eyes have a tendency to go through equal rotations but are forced into unequal rotations (in other words, into a vergence movement) for the maintenance of the same goal. Under both sets of circumstances, eyestrain may ensue, but they are still not identical circumstances, and surely the forced misalignment of the visual axes under the second set of circumstances should not be called anisophoria.

One can, of course, have anisometropia *and* anisophoria. Lebensohn has stressed the importance of real anisophoria in clinical refraction. He was especially interested in the difference of vertical phoria in two selected positions, (1) looking at distance, and (2) with eyes depressed and converging for the task of reading. I have, unfortunately, no time to discuss this beautiful piece of work. I can mention only one of its most amazing aspects which is relevant to my topic. Lebensohn found that anisophoria will sometimes be of such degree and direction as to compensate for the undesirable differential prismatic effect of unequal corrections. Take the case of corrected right myopia of 4.00 diopters with emmetropia on the left side. Looking down to read through a portion of the lens which is, say, eight mm. from its center, the myopic eye must turn less by 3.2 diopters than its fellow eye if binocular vision is to be maintained. This lens-induced vergence might be the cause of considerable eyestrain. Should this patient manifest a right hyperphoria of appropriate amount *only* when looking downward and not when looking straight, then the base-down effect of the minus lens in the lower field of gaze will just compensate for this, in this case almost purposive, anisophoria. No prism, no slabbing-off, no size lens will be neces-

sary to equalize ocular rotations into the specific position.

A size lens is only one of the means of compensating for the forced vergence caused by unequal refractive correction or, to be more accurate, inequality of retinal images. A prism works in a similar manner, at least in one part of the field of gaze, in a specific direction. So will the slab-off method. The main difference is that a size lens influences the position of the retinal image and the extent of the ocular gaze movement in at least two directions (if it is of the meridional type) or in all directions (if it is of the over-all type), while a prism or a slab-off arrangement influences them in only one direction. If the essential difficulty is in the vertical meridian, especially in the reading position of gaze, a prism added to a bifocal segment or the slab-off arrangement might be sufficient and a cheaper solution. If the difficulty is caused by forced horizontal vergence or (what is the same) horizontal size difference, this type of optical correction will be useless. Here only size correction helps. To explain the essential similarity of action of the three seemingly so different principles of correction, some simple diagrams will help. These diagrams are, in fact, oversimplified and do not reproduce the complexities of the actual trajectories of rays, and for this I have to apologize. They will I hope, serve well enough to clarify some points.

Take again the two points, A and B (fig. 1), in visible space which at the nodal point of the simplified (so-called reduced) eye subtend an angle of α degrees. The separation of their images on the retina can also be said to be α degrees. The need for oculorotation to turn the gaze from A to B is also α degrees.

In the other eye (fig. 3), which carries a minus lens for correction of myopia, the nodal point ray from the same point B will reach the eye under a smaller angle $\alpha-$, due to the prismatic effect so well known to Jackson. The retinal image of point B will be closer to the retinal image of point A. We generally say that the retinal image is smaller. And, as Jackson recognized, this eye has to turn only $\alpha-$ degrees to look from A to B. For the elimination of this difference in necessary version movements, of this forced vergence, there are, as I said, three methods available. Figure 4 shows the action of a so-called size lens. This lens gives the rays from B an added twist, counteracted by the corrective minus lens, so that the image finally reaches the retina under the desirable

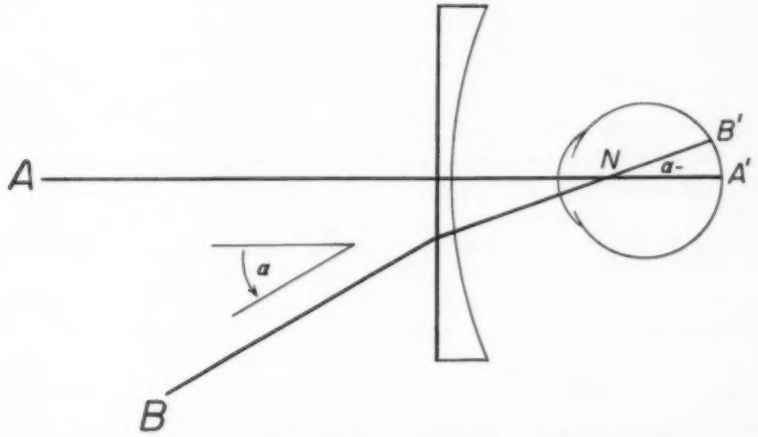

Fig. 3 (Linksz). Diagram showing effect of minus lens for correction of myopia on retinal image size.

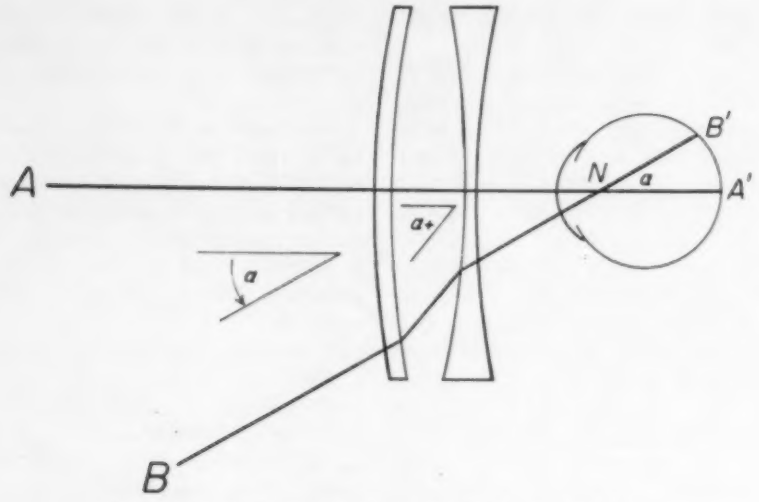

Fig. 4 (Linksz). Diagram showing action of so-called size lens.

angle α. A prism which gives the ray from *B* the same desirable twist is shown in Figure 5. Finally, the slab-off arrangement is shown (fig. 6). This gives the minus lens a second optical center in some more desirable position. Thus, the bending of the ray is eliminated and the image of *B* on the retina is in the desired location.

The second solution works, of course, only in case bifocals are needed. Instead of a straight prism, one can, according to the procedure advocated especially by Lebensohn, use different bifocal segments: an Ultex-type segment in front of the emmetropic eye, or a flat-top segment in the concave lens, or a combination of both.

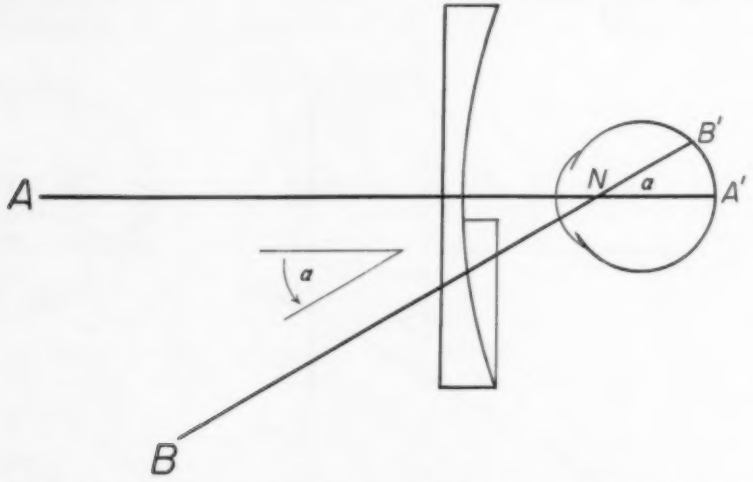

Fig. 5 (Linksz). Diagram showing the size-correcting action of a prism placed into the lower half of a minus lens.

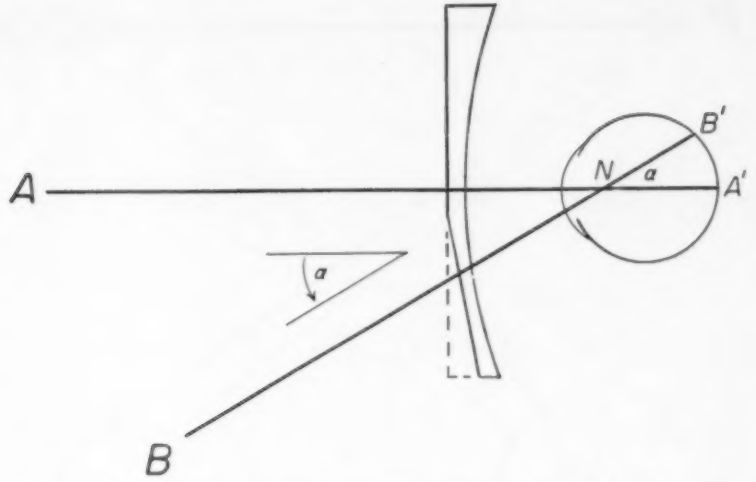

Fig. 6 (Linksz). Diagram showing the size-correcting effect of the slab-off arrangement.

Here a justified question will arise: Why bother with eikonometry and iseikonic lenses if such seemingly simple measures help too? To this, the answer is twofold. First of all, one actually should not bother with size measurements and size lenses if such simple measures suffice. Second, one does not actually give full justice to the problem of aniseikonia if one completely identifies its effects with those of the forced ocular vergence movements, as Jackson did in his earlier papers. There is much more to aniseikonia, as the work of Ames and his collaborators has revealed. Forced vertical vergence movements might become a problem in reading, especially through bifocals, since eyes are not normally meant to carry out vertical vergence movements to the extent called for by considerable image inequality. But in the horizontal direction ocular vergence is part of our normal binocular equipment and aniseikonia is a normal occurrence. Our "normal" aniseikonia, as Lancaster called it, in the horizontal direction offers our clues of relative distance. There exists an intimate relationship between horizontal image size difference, horizontal vergence movements, and spatial localization. In fact, these are the physiologic basis of stereopsis. "Abnormal" aniseikonia, if it exists in the horizontal direction, does much more than force the eyes into compensatory vergence movements. It falsifies our concept of spatial relationships.

Figure 7 shows the two eyes directed at some extended pattern PQ in the frontal plane. If, as in this diagram, the pattern is symmetrical to the sagittal plane, then the retinal images in the two eyes are equal. And if the foveas turn from looking at P to looking at Q, then both eyes turn the same number of degrees. There is no need for any vergence movement.

In Figure 8 the eyes are shown to look at the same pattern PQ. This, however, subtends an angle with the frontal plane and therefore its images in one eye (it happens to be the right eye) will be larger than in the other eye. And if the eyes turn from P *to* Q, the right eye will have to turn a greater number of degrees than the left. A vergence movement must occur in the horizontal, which certainly is not abnormal, and certainly is not inducive of eyestrain, which, in Professor Blank's opinion, is the very

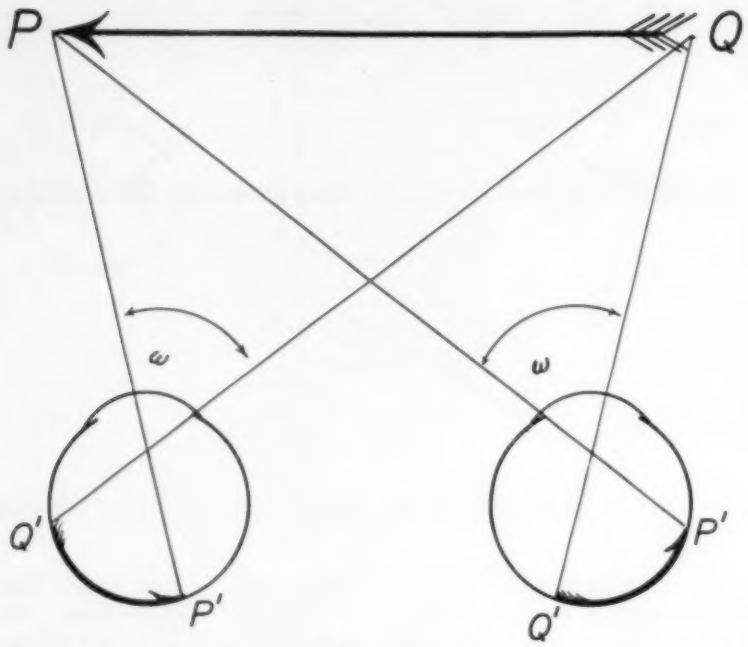

Fig. 7 (Linksz). Diagram showing the equal retinal images of an extended pattern symmetrically located in the frontal plane.

clue by which we tell that *Q* is farther from us than *P*. This is what Lancaster called "normal" aniseikonia.

Figure 9, from Ogle's book *Researches in Binocular Vision*, shows a magnifying lens placed before the right eye. The image becomes larger in the right eye and *Q* appears farther than *P*, while, in reality, both are at the same distance from the observer. If one has this type of image size difference, a wall might appear distorted though we know from experience that it is rectangular, the floor might appear slanting though our feet tell us that it is level. Jackson acknowledged that one might become aware of such distortions when wearing new eyeglasses, and he acknowledged at long last that aniseikonia is the cause of these disturbing experiences. But he strongly believed that the brain learns to re-interpret its clues. Of course it does.

Jackson believed that binocular spatial localization is altogether a learned function. Hering's views of innate spatial values were entirely strange to him. I am, of course, biased in the direction of Hering's views and wish I had time to discuss this important aspect of visual physiology on this occasion. But even if one assumes that binocular spatial localization is all learned, why should the brain be forced to re-interpret wrong clues when the clues can be made right without disturbing what to Jackson appeared to be the first concern—the accuracy of the refractive correction? I can, after many years of experience as a clinician, confidently make the statement that the correction of aniseikonia of small amounts, in the proper case, marks the difference between success and failure in the proper prescription of refractive correction. Why not avail ourselves of the additional method of improving our results in the proper cases?

The Manhattan Eye, Ear and Throat

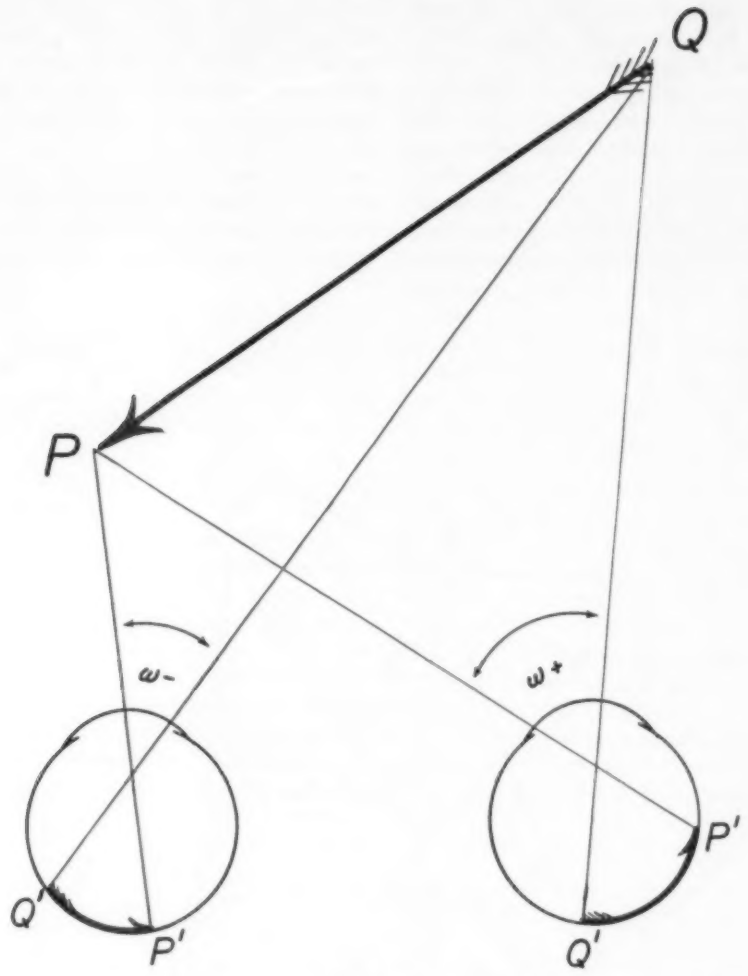

Fig. 8 (Linksz). Diagram showing unequal retinal images of the same pattern tilted relative to the frontal plane.

Hospital established its Aniseikonia Clinic in 1944 at the initiative of Dr. R. Townley Paton. Surely much credit is due to Dr. Paton for his imaginative leadership of this institution, and I personally must express deep gratitude for the opportunity given to me to do this work and grow with it. I ran that clinic for 11 years and during that time I saw a total of 2,666 cases in consultation. Of these, only a small part came through the hospital's refraction clinic—423 in all. A hospital refraction clinic is, in spite of the tremendous material available, usually not the right place to conduct research on problems of refraction, especially refinements of refraction. Most of the residents are uninterested in anything but surgery; we would need another Jackson, or another Lancaster, to impress upon the young generation that the study of vision and the correction of its

defects is one of the noblest endeavors, worthy of the attention of anybody who has had the title Doctor of Medicine bestowed on him. We need more eye doctors doing better refractions rather than lobbyists and public relations experts to take care of people with vision problems. Most of the cases sent to the Aniseikonia Clinic were private patients sent by colleagues. The total of cases I saw represents an impressive material and its statistical evaluation might have been worth while. Unfortunately, I could not carry it out all by myself. I submitted several unsuccessful requests for grants. With the full-time help of a record librarian or a secretary and the part-time help of a statistician, much could have been accomplished. It would have been especially important to ask for follow-up notices from referring doctors or from patients, or both. The greatest de-

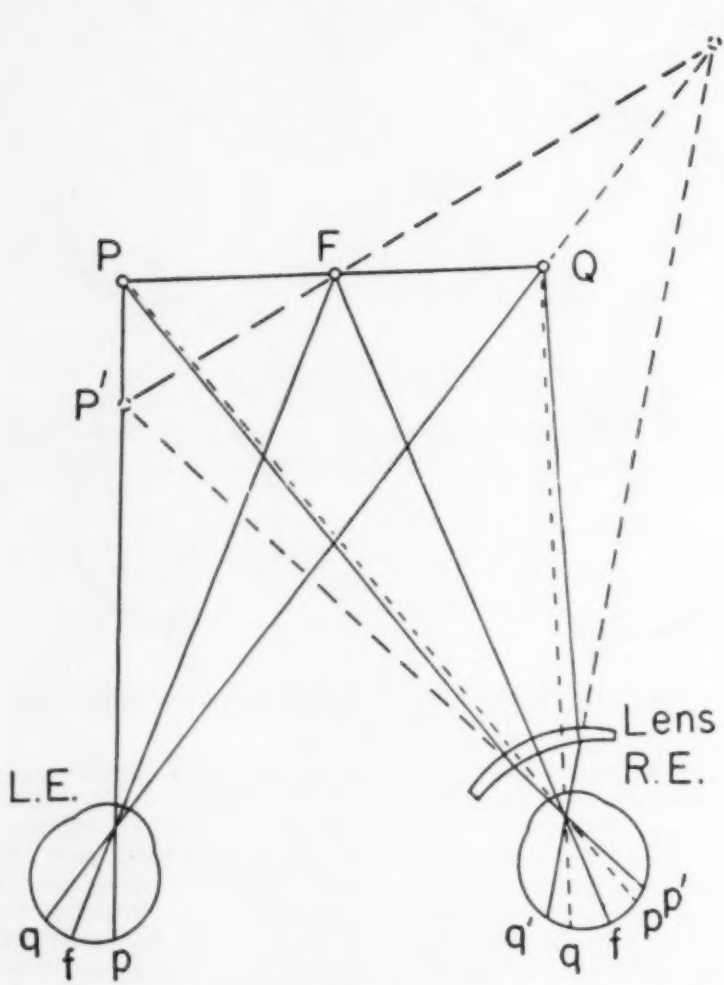

Fig. 9 (Linksz). Diagram from Ogle's book *Researches in Binocular Vision*, showing the effect of a magnifying lens placed before the right eye.

fect in my material is poor follow-up. I had no personal jurisdiction over the majority of these patients—all those sent by colleagues. I acted only as consultant. I always sent a letter of evaluation to the referring doctor. Usually the letter contained some recommendation, often a suggested prescription. What happened to the patient I could only tell if the referring doctor cared to tell me or if the patient returned. At least half never did.

Since this method of evaluation turned out to be impossible, due to lack of time and help, I had to choose a different approach. I took the case histories of patients whose names started with the first and the last letters of the alphabet, 570 case histories in all, and perused them for the purpose of this lecture. This represented less than one fourth of the total material. And even of these a greater number had to be discarded from further evaluation. Patients were often sent who had no place in an aniseikonia clinic, as, for instance, patients who had poor binocular vision, or none at all—even patients with obvious strabismus. They might have had considerable anisometropia (this was the reason for which many had been referred), they might, theoretically, have had unequal retinal images, but they certainly did not suffer from that strictly defined visual-functional disturbance in which binocular vision is present and compulsive and inequality of retinal images causes errors of spatial judgment and, first of all, eyestrain. Furthermore, there were many cases in which it became obvious to me that a better refraction or a more complete analysis of ocular motility was all that was needed, or that the case was one for muscle surgery. At one time I had clients of a New York reading institute sent to me. Many of these people were helped considerably through my efforts, but hardly any by a correction for aniseikonia. I think that aniseikonia as such is not a cause of reading difficulty. Therefore, all of these cases had to be eliminated. I also discounted most of those who were seen only once. Thus, from a total of 570, there finally remained a group of 265 in which a successful test for aniseikonia was carried out and who were either seen more than once or revealed some unusual or interesting features. There were another 164 cases available to me; these were my own patients in whom the refraction, ocular motility and binocular functions were tested by me and in whom the decision to carry out a test for aniseikonia was my own.

One of the interesting features in this limited survey is the existence of aniseikonia in patients who are emmetropic. As far as my clinic material is concerned, I always had to take the word of the referring physician, *his* criteria of emmetropia. One or the other patient might have been reported as an emmetrope simply because he or she had 20/20 vision without glasses in each eye. But even in my private material there are cases in which, with the most meticulous of subjective tests, especially the Lancaster-Regan dial, I could detect no astigmatism or spherical error. And there were also cases showing aniseikonia in which the error of refraction was identical in both eyes. In order to avoid any misunderstanding I want to make it clear that patients with the following correction:

O.D., +1.0D. sph. ⊂ −2.0D. cyl. ax. 135°
O.S., +1.0D. sph. ⊂ −2.0D. cyl. ax. 45°

cannot be considered to have identical refractive error in the two eyes, at least from the point of view of the aniseikonic clinician. Burian and Ogle emphasized this quite some time ago. Such a case must be considered to have a difference in refraction of two diopters in both the 45 and 135 meridians and can be expected to reveal considerable image size differences in these oblique meridians. Cases with this type of refractive error:

O.D., +1.0D. sph. ⊂ −0.5D. cyl. ax. 180°
O.S., +1.0D. sph. ⊂ −0.5D. cyl. ax. 90°

are also not iso-ametropes. Several patients

TABLE 1

OVER-ALL IMAGE SIZE DIFFERENCE IN RELATION TO REFRACTIVE DIFFERENCE IN DIOPTERS IN 164 PRIVATE PATIENTS

Refractive Difference in Diopters	No. of Cases	Patients with Over-all Image Size Difference					
		0.50–0.75%		1.00–1.75%		2.00% and Over	
		No.	%	No.	%	No.	%
0.0 –0.37	71	20	28	18	25	1	1
0.50–1.00	43	8	18	7	16	1	2
1.12–2.00	32	5	16	13	47	3	9
>2.00	18	1	6	5	28	5	28

with this type of refractive error were found to have considerable visual difficulty and eyestrain. They have definite, easily measurable aniseikonia.

Among my own 164 patients tested for aniseikonia, there were 30 cases with no error in refraction, or no difference in refractive error in the two eyes; there were 41 cases in which the greatest difference in any meridian was 0.12 to 0.37 diopters, and 43 in which the difference was 0.50 to 1.00 diopters. Thirty-two patients had a maximum difference of 1.12 to 2.00 diopters, and in 18, the difference between the refractive errors of the two eyes was over 2.00 diopters.

It is amazing to see that, even in my practice, in which by the very nature of my specialized interest there is a greater percentage of patients with eyestrain, headaches or reading difficulty than in the usual ophthalmologist's practice, the number of patients with a difference in refraction of more than 2.00 diopters *and* in need of correction for aniseikonia is so small. Again I must remind you of Jackson's words of wisdom, that only people with lesser amounts of anisometropia have eyestrain; those with larger amounts just don't have the compulsion to binocular vision. If sent to the aniseikonic clinician, they seem to have been referred for no justifiable reason. They might have aniseikonia in the literal sense—unequal retinal images—but they do not *suffer* from aniseikonia, that derangement of binocular vision which is the topic of this discussion, because they have no, or only rudimentary, binocular vision.

Table 1 shows some of the data of my office material. (I shall restrict my discussion to those cases that show over-all size difference.) The patients who show a difference of not more than one diopter between the two eyes belong in the same group, statistically. Patients with anisometropia greater than one diopter again are a somewhat uniform group, though there is some difference. In the group in which the difference in refraction between the two eyes is more than one but less than two diopters, over-all image size differences of 1.0 percent to 1.75 percent prevail, while in the group in which the difference is refraction is greater than two diopters, a significant number have aniseikonia greater than 2.0 percent.

Patients with meridional size difference only do not show such a definite trend. There is not a sufficient number with over-all and meridional size difference in my material to warrant any conclusions. Rare also are the patients in whom the image of one eye is smaller than that of the other eye in one meridian and larger in the opposite meridian. I have not tabulated these values for this report.

Among the hospital cases which I had a chance to analyze for this review (table 2), there are a sufficient number, 32 of the 265, in which the referring doctors reported no refractive error. I thought it worth while to separate them for this study. Four of them,

TABLE 2

OVER-ALL IMAGE SIZE DIFFERENCE IN RELATION TO REFRACTIVE DIFFERENCE IN DIOPTERS IN 265 HOSPITAL PATIENTS

Refractive Difference in Diopters	No. of Cases	Patients with Over-all Image Size Difference					
		0.50–0.75%		1.00–1.75%		2.00% and Over	
		No.	%	No.	%	No.	%
No error	32	8	25	4	12	0	
0.0 –0.37	134	39	29	18	13	2	1
0.50–1.00	50	8	16	15	30	2	4
1.12–2.00	22	2	9	7	32	3	14
>2.00	27	0	0	3	11	11	41

or 12 percent, had an over-all image size difference greater than 1.0 percent. Amazingly, the largest category in this group of 265 is made up of cases in which the difference in reported refractive correction was nil or less than 0.37 diopters. The number in this category is 134. This shows that doctors who sent cases to the hospital were thinking of aniseikonia as a possible cause of eyestrain even when there was no obvious anisometropia. They were right in this assumption in a number of cases, though in the majority it was necessary to exclude aniseikonia as even a possible cause of the eyestrain or other difficulty for which relief was being sought by the individual patient. Over-all image size difference of 1.0 percent or more was found in 20 cases in this group, or approximately 14 percent. In another 50 cases, the difference in refractive correction was given as 0.5 to 1.0 diopter. Seventeen of them, or 34 percent, showed over-all size difference of 1.0 percent or greater. In the next group in which the difference was given as 1.12 or 2.00 diopters, there were 10, or 46 percent, with the same, probably significant, amount of aniseikonia. And finally, again there was that small but interesting group of patients with large difference in refractive correction, over 2.00 diopters, but binocular vision good enough to make determination of aniseikonia feasible. None showed image size difference of less than 1.0 percent, and in some of them values were found which were larger than those encountered in any other group. The number of patients with high over-all *and* meridional image size difference is also significant for the size of this group and the difference also runs at the highest percentage level. I have discouraged several of these patients in their insistence on binocular vision.

It might be a digression from my topic, but I cannot help interjecting here a few words about the compulsion to binocular vision. I don't mean compulsion in the sense used by Ogle, the compulsion in normals to see single when prisms are introduced or other kinds of stress put on the binocular mechanisms. I mean the compulsive neurosis of parents who drag their children from orthoptists to surgeons, and back again, driven by the anxiety and guilt modern parents feel if their children are not "normal" in some respect. Binocular vision, or the lack of it, becomes an obsession with them. And this obsession is nurtured by practitioners, who either don't know better or—I may be forgiven for this inference—have an interest in giving exercises. I am not against eye exercises. With the recent advent of pleoptics, about which many of us heard so much at the recent International Congress, I believe that the treatment of amblyopia ex anopsia has reached a new era, and that amblyopia has to be combatted by every possible means. I also believe that with the early surgical intervention now practiced, the stage is set for better results than heretofore in the field of binocular training. Much can

be achieved that was impossible decades, even years, ago. But I am still convinced that a teen-age girl who is emmetropic, or nearly so, in one eye and myopic in the other —like one of the patients in whom I found aniseikonia of more than five percent—is better off if she is not trained to use both eyes together but is left alone to use one eye for distance, the other for near. It is my conviction that people with compulsive binocular vision *should* be corrected for aniseikonia if it interferes with the efficiency of binocular vision or if it is the cause of eyestrain. Children with defects in binocular vision should be given every opportunity to develop it or improve it. On the other hand, teen-agers and, especially, grownups, if they have no compulsive binocular vision, should be left alone.

As long as I am disgressing, I might say a few words about another source of parental chagrin, the so-called reading difficulty mentioned earlier. Several patients have been sent to me because of their inability to read, which, by the way, was described for the first time in this country by our great Edward Jackson. He called is "developmental alexia," rejecting the name "congenital word blindness" given to it by earlier European authors. Jackson had already noted that errors of refraction cannot be blamed for it, though in all the cases he found in the literature the patients were hyperopes. Nor can aniseikonia be blamed, at least not generally speaking. I did have a few cases in which reading skills were picked up with remarkable speed after this obstacle to binocular co-ordination was found and removed. But some of these children will improve in reading as soon as something, anything, is being done for them, breaking what seems to be a vicious circle. In the majority of instances, I must confess, results of eye consultations in cases of retarded reading faculty are disappointing—disappointing to parents who expect something tangible, something physical which they can blame for an inability for which there is actually no pathologic background. Reading difficulties in the Anglo-Saxon *Kulturkreis* are caused by several factors. One is the inability, or reluctance, to shed superficial manifestations of the sacred past: Beefeaters wear uniforms and justices wigs which are outmoded, expensive and uncomfortable. A similar spirit keeps spelling unnecessarily complex and archaic. For no good reason but the historical, the vowel in *speak* and *speech* sounds the same but is spelled differently while in *break* and *breach* it is spoken differently. (It would be redundant to mention *bread* as a further example of the same letter combination pronounced in a still different manner.) Children are logical beings: they crave rule and order. The haphazard complexities of the grownup's world are strange to them and frustrating. The obvious inconsistencies of spelling make the learning of reading and writing in English unnecessarily difficult. A second important factor is the egalitarian character of education. Our schools don't know what to do with the gifted child, and our teachers have no time to devote to those less capable than the so-called average. However, the main offender is the preposterous idea of teaching sight reading instead of phonics at the elementary level. This really puts the cart before the horse. A young mother, all in a panic, brought her lovely son to me because she was told that her child suffered from strephosymbolia, that the pictures in her child's brain were reversed. He mixed up *was* and *saw* in the reading test. The teacher taught him to read the following "word picture"

W A S

as *was*, and the following word picture

S A W

as *saw*, but she was a proponent of sight-reading and forgot to teach that one reads letters within words from left to right. This little boy was a genius. In spite of his teacher he found out that the two unrelated word pictures consisted of the same picture elements, but he had no lead as to the concept of directional perception of these ele-

ments, which is the basis of all reading based on alphabets. There is no intrinsic reason why the letter combination *o* on the left and *n* on the right should be read as *on* rather than *no*. I am convinced that reading from left to right has nothing to do with the dominance of the left brain. The Phoenicians, the inventors of our system of writing, wrote from right to left. Some of the old Eastern Mediterranean people wrote *boustrophedon*, one line from left to right, the next from right to left, and so on, alternately. Semitic writing continues to go from right to left. Many of us, like myself, brought up in the traditions of more than one culture read with equal facility in both directions, though we always write with the same hand—with the right if we are right-handers. Scholars familiar with the history of writing generally agree that the final preeminence of the "abductor" type of writing (that is, from left to right with the right hand) was due to technical advances in writing materials and the introduction of the brush and quill as writing utensils. It could have nothing to do with any preponderance of one side of the brain. I was three years old when I simultaneously learned to read Hungarian, German and Hebrew. I suffered no strephosymbolia and read the first two from left to right and the last in reverse order. Dr. Jackson agreed with Nettleship that the best method of combatting a'lexia is the teaching of reading at as early an age as is possible. And I don't think he referred to sight-reading. Crisp, in his beautiful paper on reading difficulties, went even further. He threw the whole false concept of so-called reading readiness overboard, and urged mothers to take things into their own hands by teaching their children the alphabet even before they entered school. A child being taught to read and play music must first learn the individual notes and then acquire facility in playing the scales. Grasping the meaning of a piece of music comes later. Temporal order is inherent in reading the music as well as playing it and in grasping its meaning. One does not grasp *no* as a symbol outside of time. We don't read Chinese. One pronounces the *n* as a sound element preceding the sound element *o*, and even in the fastest reading, when we allegedly see whole words or several words simultaneously, the temporal sequence is always present. There is, unfortunately, no time to dwell on this subject any longer.

I have to say a few words about metamorphopsia, a condition in which patients spontaneously report that with one eye they see things smaller than with the other. Metamorphopsia is not aniseikonia, Patients with so-called retinitis macularis exudativa have micropsia in their affected eye because edema has separated the retinal elements in the macular region. Usually they also notice a marked distortion of straight contours, obviously because the derangement of cellular architecture occurred in an irregular manner. Since several of these patients were sent to my clinic to be measured for aniseikonia, I had to test them. They only added to the number of patients seen, but they themselves derived no benefit from my examination.

The most impressive cases of aniseikonia are the very rare traumatic cases. I have encountered two in the last two years in which an accident to one cornea, a perforating injury with iris prolapse, fortunately not affecting deeper structures, had caused unilateral oblique corneal astigmatism in an eye which heretofore had been essentially like the other eye. These patients had what one could almost call "acute" aniseikonia. The size difference they revealed in the eikonometer test was practically predictable and commensurate to the optical defect.

As far as acute aniseikonia is concerned, we all know, of course, of cases in which refractive correction was changed and the patient suddenly was heard to complain of slanting desks, of trapezoid newspapers, or of feeling himself a foot or two taller or shorted than usual. These were the cases which Jackson accepted as genuine examples of aniseikonia. He was sure that the mind

gets used to these phenomena, but he believed that nothing had to be done about it as long as the refractive correction was proper. He certainly was right in some cases, though surely not in all. Often the mind gets more used to a correction if it is incorrect, so to speak, because the retinal image is not quite so sharp and the long-accustomed pattern of suppression less disturbed. The small number of anisometropes in my private practice who are given size lenses testifies to my utmost efforts to straighten out my refraction problems without resorting to this type of correction. Reduction of cylindric lens power in the nondominant eye is the most successful, usually, among these procedures. I often almost indulge in the art of inaccuracy. It *is* an art, I confess. In any event, it is the distillation of experience of many years. Here are two examples. The first, an executive, aged 49 years, who until about two years before he was sent to me had no eye trouble. The first and only pair of glasses he ever was given read:

O.D., −0.75D. cyl. ax. 180°
O.S., +1.75D. sph. ⊂ −0.5D. cyl. av. 178°
Add +1.0D., O.U.

He could never wear these glasses. He saw double. Though at his referring doctor's request I tested him for aniseikonia (and with his own glasses he revealed a lot of it), I suggested the following simple reading correction:

O.D., +1.0D. sph.
O.S., +2.5D. sph.

to the patient's great satisfaction.

The second example, a housewife, aged 48 years, wore the following correction given by the referring doctor:

O.D., +1.5 sph. ⊂ −0.5D. cyl. ax. 30°
O.S., −1.25D. sph. ⊂ −1.5D. cyl. ax. 180°
Add +1.5D., O.U.

The left eye was dominant for close work and I ordered:

O.D., plano
O.S., +0.75D. sph. ⊂ −1.5D. cyl. ax. 180°

The young salesman I noted earlier in this lecture (the aniseikonic clinician's dream case, I might call him) could certainly never be handled in this manner. That was a case which fully fits into Jackson's specifications: that both eyes present "ametropia of low degree distinctly differing in kind and degree." As I already mentioned, this patient had small myopia in one eye, small hyperopia in the other eye, with astigmatism against the rule in the former, astimgatism with the rule in the latter. In his case only accurate correction with full correction of aniseikonia gave relief.

An unusual case of acute aniseikonia which taught me quite a lesson is probably worth mentioning. An elderly woman, wearing the following refractive correction:

O.D., −2.0D. sph. ⊂ −2.0D. cyl. ax 90°
O.S., −1.5D. sph. ⊂ −2.75D. cyl. ax. 85°

came to see me with a recent macular degeneration which reduced vision to 20/200 in the left eye. She wanted new glasses. There was some small change needed in the right eye. Since I could not improve vision in the left eye, I wanted to make the lenses less expensive and prescribed only a −1.5D. sph. for that eye. The patient returned, indignantly complaining that with her new lenses all was lopsided and floors and walls were distorted. Though she had hardly any central vision in one eye, the power of peripheral fusion, emphasized by Burian, made itself manifest. I learned my lesson but lost a patient.

At the end of this lecture, I should mention two, if small, pieces of research to which my clinic at the Manhattan Eye and Ear Hospital contributed. Two groups of patients were found in whom more than usual image size differences can often be detected and their correction seems sometimes desirable, often feasible. In the first group belong the patients who have been successfully operated upon for unilateral retinal detachment. In some of these cases, quite by accident, I discovered that the image in the operated eye was smaller. I should not say

quite by accident. Dr. David Webster, surgeon-director at Manhattan Eye and Ear Hospital, a wise clinician, honored friend and supporter of my work, sent me the first patient, a man, aged 65 years, whom he had successfully operated upon for retinal detachment of the right eye and who complained of much distress after the operation. The findings pertaining to this case are summarized in the following lines:

O.D., +1.0D. sph. ⌒ −1.5D. cyl. ax. 95° = 20/30
O.S., +0.75D. sph. ⌒ −1.25D. cyl. ax. 95° = 20/25

There was a right hyperphoria of four prism diopters present. Testing for aniseikonia revealed that the right image was smaller by 2.5 percent vertically, five percent horizontally. Size correction worn now for several years gave considerable relief.

I have, of course, only limited experience. There are still too few cases of retinal detachment in which both the eye operated upon and the other eye have sufficiently good vision to make these patients fall into the category of people in whom measurements for retinal image size differences are feasible. Even smaller is the number of cases in which, after a successfully conducted test of measuring aniseikonia, I found it advisable to correct this condition. The differences were again usually much larger than those encountered in normal pairs of eyes and the compulsion to binocularity much reduced. To my dismay, I find that even after what is considered a successful detachment operation, still more people consult me for a visual aid than for the restoration of their binocular functions.

In any event, the cases aroused the interest of Dr. Donald Shafer. He and his associate, Dr. Brian Curtin, have sent me 12 of their patients who had been successfully operated upon for image size determination. Dr. Curtin presented these cases at the meeting of the Pan-American Association of Ophthalmology last year, and his presentation aroused considerable interest. One case, especially worth mentioning, could be tested before and after operation for a small peripheral detachment in the left eye.

Refraction and visual acuity were as follows:

O.D., +2.0D. sph. ⌒ −0.75D. cyl. ax. 5° = 20/20
O.S., +2.0D. sph. ⌒ −0.75D. cyl. ax. 5° = 20/25

Left image smaller in vertical meridian by 0.5 percent. Five weeks after vitreous implant and electro-surgery:

O.D., +2.0D. sph. ⌒ −0.75D. cyl. ax. 5° = 20/20
O.S., −0.50D. cyl. ax. 135° = 20/20

Left image smaller in horizontal meridian by two percent.

Interesting in this case is the disappearance of hypermetropia. Having only one such case, I cannot even speculate on the possible influence of vitreous surgery on ocular refraction.

The other piece of research was initiated at the request of Dr. Elizabeth Constantine and Dr. John McLean, who published a remarkable series of cases of unilateral aphakia corrected with contact lens. I tested several of their patients and found image size differences to be between four and 10 percent, as expected from theory. I do not know of a single case in this series in which it was necessary to correct aniseikonia. Dr. Constantine in her lecture emphasized the fact that these patients were tested and found to possess the faculty to binocular single vision. But showing the faculty to binocular vision in office tests specifically conducted to analyze this faculty (I usually call it "instrument stereopsis") does not mean normal compulsive binocular vision under everday circumstances. I can only refer to a recent important paper by Ogle, Burian and Bannon on this subject. They, too, doubt that patients with unilateral aphakia corrected with contact lens have, in everyday surroundings, normal (which

means compulsive) binocular vision. In fact, their computations convinced them that when aniseikonia is greater than three percent, retinal images fall outside each other's Panum's areas everywhere except within an area of four degrees around the point of fixation. Aniseikonia of the magnitude usually present in the case of contact-lens-corrected uniocular aphakia prevents fusion and causes physiologic rivalry and physiologic suppression in the retinal periphery. These mechanisms work constantly in all of us, on all object details which are outside the horopter, making up the usual background and surroundings into which our foveal vision is planted. There is no reason why these patients should have eyestrain. The person whose uniocular aphakia is corrected with a regular spectacle lens, however, belongs in an entirely different category. In his two eyes similar retinal images fall way beyond the fusion limits and way beyond the rivalry limits. Like a person with sudden paresis of an extraocular muscle, these patients see doub'e. Spectacle correction of monocular aphakia with some 30 percent image size difference usually causes confusion and serious visual difficulties. But it does not cause the type of eyestrain which aniseikonia does.

I have an interesting patient in my own practice, a woman, bilaterally aphakic, who wears contact lenses in both eyes. She was extremely uncomfortable with these as well as with previously tried spectacle lenses. Her spectacle refraction is:

O.D., +12.25D. sph. $\bigcirc$ +2.0D. cyl. ax. 115°
O.S., +13.0D. sph. $\bigcirc$ +0.5D. cyl. ax. 45°

Her contact lenses, made by Obrig in New York, had 8.05 mm. radius in both eyes, and

O.D., +18.62D.
O.S., +19.37D.

power. Over these contact lenses she now wears a pair of spectacle bifocals with

O.D., 1^{Δ} base-down $\bigcirc$ 2% O. A. magnification
O.S., 1^{Δ} base-out

in the distance portion of the lens and a suitable reading addition. She is a changed person.

And there are many similar cases. Some have been followed now for more than 20 years at the Dartmouth Eye Institute and in the practice of several of its graduates. It has been possible for us to give relief to some and to lessen inefficiency and agony in others. Even if Dr. Jackson doubted that the initial findings were significant and the results relevant, aniseikonia is a clinical entity of importance and is here to stay.

The title of Dr. Jackson's last paper was "Clinical importance of aniseikonia." It is now 16 years since this paper was delivered. Sixteen years is quite a time to gather experience. There is now sufficient accumulated evidence that the correction of aniseikonia in suitable cases, adds to the value of refractive correction. The "Clinical importance of aniseikonia" is established without any doubt.

6 East 76th Street (21).

AN ADVENTURE IN OPHTHALMIC LITERATURE

Manuel Straub and the tradition of toxicity in lens protein

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This is the story of an adventure in ophthalmic literature. It concerns Manuel Straub, a great ophthalmologist (fig. 1), who in the course of his Odyssey made observations of the highest scientific importance and who died apparently unaware of their true significance. The story centers on the development of the widely held belief that hypermature or degenerating lens protein is toxic and irritating to the eye and is thus responsible for a specific type of intraocular inflammation.

Lens-induced uveitis is usually divided into two classes—phacotoxic uveitis and endophthalmitis phacoanaphylactica. Many students of uveitis believe these are distinct pathogenetic and clinical entities, the first being caused by the toxic action of a degenerating or hypermature lens, while the second results from hypersensitivity to the organ-specific fractions of lens protein. However, it is generally agreed that both conditions have many points of similarity. They are similar in that they have the same etiology, both stemming from some phlogogenic property of lens protein. Further, one group may merge into the other, and in the midzone differentiation may be quite difficult. For these reasons other students believe that the two conditions are only different manifestations of the same disease process and that in addition to the common etiology, they also have the same pathogenesis.

The *pros* and *cons* of this argument were briefly reviewed in the 1957 Proctor Lecture, and although the weight of evidence undoubtedly inclined towards the hypersensitivity hypothesis, it appeared that as yet there was no clear answer to the question. In this lecture the words "tradition of toxicity" were used in relation to the presumed toxic action of hypermature lens protein.

Fig. 1 (Woods). Manuel Straub.

This phrase was used for the reason that the review of the literature, made preparatory to writing the lecture, had revealed no actual proof or positive demonstration of any toxic substance in hypermature or degenerating lens material. All the evidence indicating such a toxicity was either clinical, circumstantial, or if experimental, was open to serious question.

About the time of the delivery of this lecture in December, 1957, an (as yet unpublished) observation by Dr. A. E. Maumenee indicated that in one particular case, which would certainly have been diagnosed as phacotoxic uveitis by the protagonists of the toxic hypothesis, the extracted lens was nei-

ther toxic nor irritating to normal animals or tissues, and that in this patient there was sound reason to believe the uveitis was a hypersensitive reaction. The literature on lens-induced uveitis was therefore reviewed again in the effort to determine from what source the tradition for toxicity of hypermature lens material had arisen, and also to search for some previously undiscovered evidence. It was this second review of the literature that lead to this adventure.

From the first review, it seemed quite evident that the turning point toward the full acceptance of the toxicity hypothesis was the publication of a monograph, the English translation of the title being—"Inflammation of the eye caused by lenticular material dissolved in eye lymph," by Manuel Straub. This monograph was written in Dutch and was published by the de Bussy firm in Amsterdam in 1919. It was never translated and published in any other language. However, two lengthy reviews in English were published in 1920. The first was by Professor van der Hoeve in the *British Journal of Ophthalmology*, and the second by the late Dr. E. E. Blaauw of Buffalo in the AMERICAN JOURNAL OF OPHTHALMOLOGY. Dr. Blaauw was of Dutch birth, had been educated in Holland and at one time had been on Straub's staff in Amsterdam. There were also several shorter reviews in the German literature. A perusal of these reviews made it clear that Straub's studies had convinced him that hypermature and degenerating lens material was definitely toxic and that such toxic lens material caused a specific type of uveitis. No less a person than Sanford Gifford was also convinced. In 1925, in a paper on the toxic and immunologic properties of lens protein, Gifford stated "Straub investigated the question thoroughly and his histological investigations proved definitely that uninfected lens material may act as a pyogenic substance calling forth a secondary iridocyclitis of a special type, which he called endophthalmitis phacogenetica." Elschnig was also convinced, for in 1922, in his article in the Graefe-Saemisch Handbuch, he stated flatly that hypermature lens material was toxic. Likewise Verhoeff and Lemoine, in their classic paper on endophthalmitis phacoanaphylactica published in 1922, mentioned two cases of uveitis which followed the rupture of the capsule in eyes with morgagnian cataracts, and stated that the inflammation in these eyes was quite different from their endophthalmitis phacoanaphylactica and was analogous to that produced by any necrotic material. They referred briefly to the Straub monograph, and while they did not identify his endophthalmitis phacogenetica with their endophthalmitis phacoanaphylactica they specifically noted that Straub had failed to consider the question of hypersensitivity to lens protein. They made no mention of the microphotographs which illustrated the Straub monograph.

When the literature on lens-induced uveitis was first reviewed, it was curious that a copy of this important monograph by Straub could not be located. It was not in either of the two excellent medical libraries in Baltimore. It was not listed in the 1932 Third Series Index Catalogue of the Surgeon General's Library, and there was no copy in any of the corresponding medical libraries. Any knowledge of its contents had to be derived from the reviews already noted —an unsatisfying and unsatisfactory procedure.

It was known that Straub had died in 1916. From a personal letter from Professor Zeeman in Amsterdam it was learned that for many years Straub had been studying lens-induced ocular disease, had made extensive notes, had collected considerable histologic material, and had planned a comprehensive book on the subject. A few days before his death, realizing his approaching exitus, he called Drs. Zeeman and de Vries to his bedside, told them of his plans which he now could never accomplish, delivered to them his notes and histologic material, and charged them with the task of correcting,

compiling and publishing them. This task they accepted and accomplished as a token of gratitude from his pupils to their beloved master. The posthumous monograph, published three years after his death, may thus almost be considered as an "Unfinished Symphony" by Straub!

If the tradition of toxicity for hypermature lens material were to be re-explored, it was obviously necessary to obtain an original copy of this monograph. Yet, although references were made to it by practically all subsequent writers on lens-induced uveitis, no copy appeared to be available in America. Since it had been published in 1919, and was not in the Surgeon General's Library in 1932, it was naturally assumed that this library had no copy. Where could one be obtained? Had other writers on lens-induced uveitis been forced, as I was, to rely on the unillustrated reviews?

In January of 1958, Dr. Volckherdt de Groot, who had formerly been on the Resident Staff of the Wilmer Institute, returned for a prolonged visit to his home in Holland where he had been born and received his medical education. I saw him before his departure, told him how anxious I was to obtain a copy of the Straub monograph, and since I could not read a word of Dutch, it would be necessary to have it completely translated into English by a trained ophthalmologist. This labor he kindly undertook, provided he could find a copy in Holland. He wrote me in February that after some search he had found a copy in the library of the Department of Ophthalmology at the University of Amsterdam, and that the publishers, the de Bussys, were friends and neighbors of his family in Laren in northern Holland. Dr. de Groot, with the aid of his wife, then proceeded to make a complete English translation of the entire book. With the hope of obtaining a copy for me so I might study the microphotographs, Dr. de Groot called on Mr. de Bussy in his home. At this visit and from a subsequent letter, he obtained the following information.

The compilers of this work delivered the manuscript to the de Bussy firm at the close of World War I, when the conditions for the publication and dissemination of new medical books were anything but favorable. Only 500 copies were printed. Fifty of these were given to the authors for gratis distribution. Ten copies were sent out as press copies. The remaining copies were placed on sale. However, only a little over 200 were sold and the remainder were left on the hands of the publishers where they remained for many years. Apparently all interest in the book had waned, and it was completely forgotten. Finally, in one of the periodic housecleanings which all publishing houses must have, all except four copies were destroyed. One of these was given to Dr. de Groot, who in turn sent it to me. The de Bussy firm had record of only one copy ever being sent to America. This was a press copy sent to the AMERICAN JOURNAL OF OPHTHALMOLOGY, and is probably the one used by Dr. Blaauw for his review.

On reading Dr. de Groot's translation, it was immediately clear that all the evidence presented to support the hypothesis of toxicity for lens protein was entirely clinical or circumstantial. There were no chemical or experimental studies, and the possibility of hypersensitivity to lens protein had not been considered. Nevertheless, the clinical reports, the histologic studies and the excellent microphotographs revealed the undeniable fact that Straub had made original observations and discoveries, the true significance of which was not appreciated at that time, and that these observations were forgotten, to be later rediscovered and reported by others.

Especially striking was the marked similarity, or the actual identity, of Straub's endophthalmitis phacogenetica and Verhoeff's endophthalmitis phacoanaphylactica. How had this been missed before? Straub's descriptions and his microphotographs would certainly have alerted Dr. Verhoeff, the ablest ophthalmic pathologist of our day, to

the fact that they were one and the same condition. Had Verhoeff and Gifford also been forced to rely on the meager descriptions in the unillustrated reviews, or were other copies of this monograph in this country which might have been available to them when they wrote their papers?

An inquiry was now made to the Library of Congress, asking if they could find any record of this volume being in any American Library. The reply was that they could locate one copy in the National Library of Medicine (the new name given to the former Surgeon General's Library). An inquiry there revealed the fact they now had a copy. There was no record in Washington of the date of acquisition, but the copy there bore the initials of a cataloguer who had left the employ of the library at the beginning of World War II. However, it was learned that the early acquisition records of the library had been moved to Cleveland where their History of Medicine Division was located. Dr. H. C. Jameson, chief of this division, made a search of these old records, only to find there was a lapse in them which included the Straub monograph. As nearly as could be judged from the acquisition numbers, the Straub item had been acquired shortly before it was bound in 1946. The proximity of this date to the time of Dr. Blaauw's death late in 1943 suggested this might have been the copy in his library. Dr. Elliott B. Hague of Buffalo was kind enough to investigate this possibility, and found that after Dr. Blaauw's death his extensive medical library had been sold to a New York dealer. Inquiry there revealed that, while this gentleman remembered several other items in Dr. Blaauw's collection, he had no recollection or record of the Straub monograph, and it was not now on his shelves. Here the trail of this particular copy ended. One thing, however, is certain—neither Dr. Verhoeff nor Dr. Gifford could have obtained a copy from the National Library of Medicine when they wrote their respective papers.

To check the possibility that a copy of this volume might at one time have been available in the medical libraries of either Boston, New York, Philadelphia or Chicago, Drs. Dunphy, Dunnington, Adler, and Vail were asked to make inquiries if this volume had ever been available in any of the medical libraries of their respective cities. Each of these gentlemen undertook this search and each reported that none of the libraries in their cities had any record of Straub's monograph.

To check further on the chance that either Dr. Verhoeff or Dr. Gifford might have consulted some unlocated copy of this monograph, the following inquiries were made:

Dr. Verhoeff was asked if he could remember from what source he had obtained his information about Straub's work when he wrote his classical paper in 1922. He replied that it was difficult to say, that it was possible he might have obtained the original monograph from one of the local medical libraries and had some Dutchman translate it, but he had no recollection of so doing, and since there was no copy in any of the local Boston libraries he believed it safe to say he had obtained all his information about it from the two English reviews.

It was learned from Dr. Frederick C. Cordes that, after Dr. Gifford's untimely death in 1944, all his medical books had been purchased by the Proctor Laboratory and incorporated in their library. Dr. Cordes investigated the question of a copy of the Straub monograph being in the Gifford collection. Treasure trove! A copy was there, bound up with several other monographs. This volume was then loaned to me by the University of California. It bore Dr. Gifford's bookplate, but was undated, and there was in it no indication of when or where it had been obtained. An inspection of the text was equally unrewarding. There were eight places where several lines had been marginally scored, but there were no notations. One lined passage concerned a patient whose first eye had shown a marked reaction after an

extracapsular extraction of the lens, but whose second eye pursued an uneventful postoperative course. Straub suggested that the absorption of a lens toxin from the first eye might have produced an antitoxic effect which benefited the second eye. But Gifford did not allude to this in his 1925 paper. Another scored passage dealt with Straub's observation that the removal of the lens from an eye with his "phacogenetic" uveitis was followed by a prompt subsidence of the inflammation. But Gifford did not mention this in his paper. Neither did he refer to the 56 excellent illustrations which were included in the monograph. It therefore seems quite possible that Gifford acquired his copy after 1925, and did not have it available when he wrote his paper.

If one assumes that Dr. Gifford had the Straub monograph available in 1924-45 when he did his work on the immunologic and toxic properties of lens protein, how can one explain why he did not recognize the similarity of many of Straub's cases of endophthalmitis phacogenetica with the condition Verhoeff had described in 1922? It may have been the almost insurmountable linguistic barrier incident to the manuscript being written in Dutch. It may have been that in the Verhoeff and Lemoine report there were only two microphotographs of the clinical histology. These were both low power, and were none too well reproduced. Without Verhoeff's actual slides it would have been almost impossible to have identified Verhoeff's endophthalmitis phacoanaphylactica with that depicted in Straub's illustrations. Even if Dr. Gifford had a full translation of Straub's text, there might well have been some difficulty in recognizing the similarity of the two conditions from the descriptions of the histology given by Straub and those given by Verhoeff and Lemoine. The latter are clear, adequate and accurate. They describe the full histologic picture, but do not emphasize any particular phase. On the other hand, Straub's descriptions stress the leukocytic reaction and emphasize that this reaches a maximum at the point of rupture in the lens capsule, and that the leukocytes penetrate the lens substance along the damaged lens fibers. Straub interpreted this as indicating that a poisonous substance arose from the lens fibers themselves. It is interesting to note that later day ophthalmic pathologists regard this leukocytic reaction as the chief point in the diagnosis of the anaphylactic form of lens-induced uveitis! Finally, since Straub's views on the toxicity of degenerating lens protein exactly coincided with those of Gifford, it is not surprising he should have emphasized them. But whatever may have been the reasons, it is certain that Gifford did not identify the leukocytic reaction described by Straub with the endophthalmitis phacoanaphylactica reported by Verhoeff and Lemoine. Verhoeff could not possibly have recognized the similarity since neither the text nor the microphotographs of Straub's monograph were available to him.

Is there anything in this monograph which actually indicates a toxicity in hypermature lens protein? What makes it a remarkable document?

The monograph begins with the premise that in the various discussions of toxicity vs. infection as the cause of lens-induced uveitis it should be remembered that the clinical and histologic pictures of uveitis caused by the toxic action of lens remnants and those caused by bacterial infection are quite different. Thereafter Straub reported in detail 17 cases which he believed represented a sterile, lens-induced uveitis. These cases were reported under three headings: (A) Uveitis which followed cataract extractions or perforating, noninfected trauma involving the lens; (B) uveitis secondary to absorption of a dislocated lens, and (C) uveitis following spontaneous absorption of the hypermature lens. Two of these cases, Straub admitted, were not clear-cut, while a third case was complicated by a large infected corneal ulcer which made it difficult or impossible to interpret correctly the his-

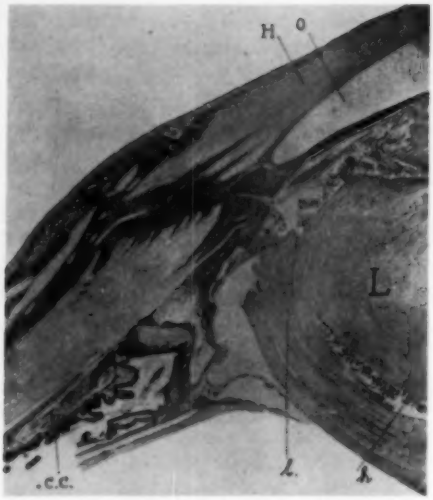

Fig. 2 (Woods). Endophthalmitis phacoanaphylactica reactions (Straub).

tologic picture. When these three cases are discarded, there remain 14 cases in eight of which the eyes were enucleated and examined histologically.

The histologic findings in these eyes fall into two somewhat dissimilar groups. In the first group, the outstanding feature stressed by Straub was the mobilization of polymorphonuclear leukocytes around the traumatized lens fibers, with a more remote nonspecific round-cell infiltration, and in the older cases a surrounding fibrovascular reaction. With the exception of the phagocytic and epithelioid cell reaction, this is the currently accepted picture of endophthalmitis phacoanaphylactica. Straub did mention the presence of histocytes in one case, and several times alluded to the "large wandering mononuclear cells with an ameboidlike protoplasm," but other than offering a somewhat novel suggestion on their origin, did not elaborate on their significance. In the second group, the characteristic feature was a lymphocytic and plasma cell infiltration, often in the form of nodules throughout the the uvea. This Straub called "absorption lymphocytosis." It exactly resembles what is now known as nongranulomatous uveitis, and is similar to the picture seen in the eyes of rabbits with experimental hypersensitive reactions. In this "lymphocytosis" group, if there was a break in the capsule, there might also be a localized leukocytic reaction around the traumatized or exposed lens fibers.

Straub's conclusions from these studies, expressed in his own words, may be summed up as follows: "In elderly people the lens substance can become poisonous to the eye when in a dissolved state it finds its way to the eye lymph. This applies to cataractous lens as well as to normal lens when a tear in the lens capsule has caused the formation of cataract. . . . This poison is phlogogenic. It provokes inflammation and the intensity of the inflammation is dependent on the amount of the poison which has been absorbed. . . . The distribution of the leukocytes shows us clearly that the toxins causing this inflammation have to come from the lens. . . . These cells (the leukocytes) indicate a fresh inflammation of great intensity.

The lymphocytic reaction demands a separate explanation. . . . Starting with the rule that there is no lymphocytic reaction without a chemical irritant, it ('absorption lymphocytosis') is not produced by large amounts of lens toxins which are suddenly discharged, but by small amounts causing a chronic irritation of weak intensity."

Reviewing these cases in the light of

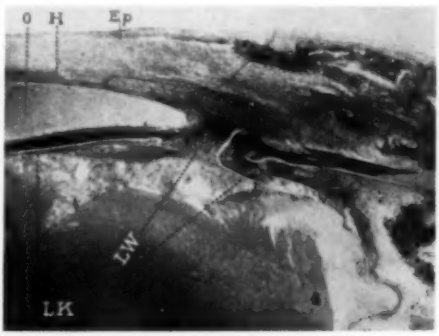

Fig. 3 (Woods). Endophthalmitis phacoanaphylactica reactions (Straub).

knowledge on uveitis acquired since the publication of this monograph, they fall remarkably well into the currently accepted classification of lens-induced uveitis.

Seven of these are clearly endophthalmitis phacoanaphylactica in the traumatized eye. In three of these cases this diagnosis is based on the clinical description, and in four it is confirmed by the histologic examinations of the enucleated eyes. Figures 2, 3 and 4 all reproduced from the Straub monograph, show the typical histologic pictures as described and depicted by him. They all show the characteristic mobilization of neutrophiles around the traumatized lens fibers, large mononuclear phagocytes (fig. 4) and the monocellular infiltration of the iris (figs. 2 and 3) on which both Verhoeff and Straub commented in their text. Figure 5, again from Straub, shows a more advanced case with the same cellular infiltration and the organization of the fibrovascular zone around the old lesion in the lens. There can be little doubt that these cases of Straub are identical with those of Verhoeff and Lemoine.

There were two cases of endophthalmitis phacoanaphylactica in the second, unoperated eye which was the site of a cataract. In the first case the inflammation began four months after an uneventful cataract extraction in the fellow eye. The second eye was finally enucleated as a lost painful eye. Histologic examination showed massive

Fig. 5 (Woods). Endophthalmitis phacoanaphylactica reactions (Straub).

monocellular infiltration throughout the posterior portion of the iris (fig. 6) with collections of similar cells in the ciliary region and choroid. There had been a spontaneous rupture in the anterior lens capsule, and where the lens fibers were exposed large masses of neutrophiles had entered the wound, and around this there was a localized leukocytic reaction (figs. 6 and 7). The identity of this picture with endophthalmitis phacoanaphylactica is again evident. In the second case, in which the inflammation in the unoperated eye came on six months after an uneventful operation on the fellow eye, the correct diagnosis of lens-induced uveitis was made, the cataract was extracted, follow-

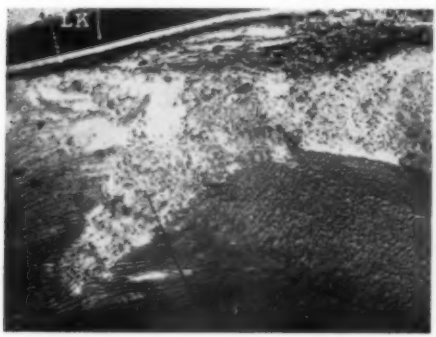

Fig. 4 (Woods). Endophthalmitis phacoanaphylactica reactions (Straub).

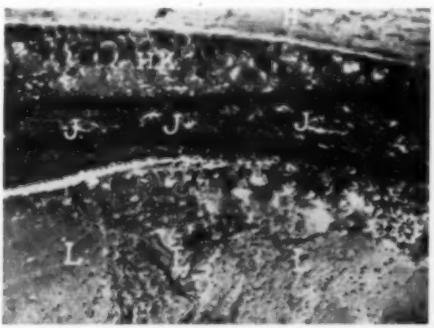

Fig. 6 (Woods). Endophthalmitis phacoanaphylactica in second unoperated eye six months after uneventful cataract extraction in fellow eye (Straub).

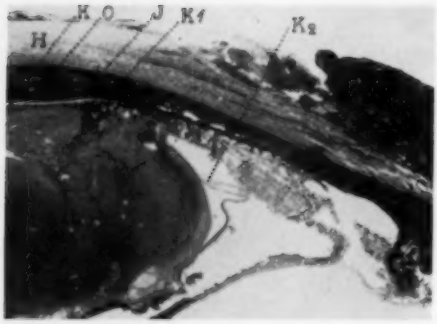

Fig. 7 (Woods). Endophthalmitis phacoanaphylactica in second unoperated eye six months after uneventful cataract extraction in fellow eye (Straub).

ing which the uveitis quieted and the eye returned to normal.

One case appears to be endophthalmitis phacoanaphylactica from spontaneous absorption of a subluxated lens. The eye was enucleated. There were no microphotographs of this eye, but Straub's description of the histology stated that the capsule of the lens had been absorbed and the lens itself was surrounded by "an envelope of leukocytes." Straub stated that while he had four eyes with subluxated lenses in his collection, this was the only one with any evidence of an inflammatory reaction.

The remaining four cases represent Straub's "absorption lymphocytosis" and were classed by him as uveitis due to spontaneous absorption of a hypermature lens. However, from the descriptions of the clinical symptomatology the first two appear clearly to be cases of recurrent nongranulomatous uveitis, the eyes finally developing organic changes and secondary cataracts, and being enucleated as lost, painful eyes. Histologic examination of both showed the picture of lymphocytic and plasma cell infiltration throughout the uvea, affecting the posterior layer of the iris, the ciliary body, and the choroid. These infiltrating cells were often in nodules. Figures 8, 9, 10 and 11 from Straub's monograph illustrate this mononuclear infiltration. In both these eyes there were anterior capsular opacities, but the capsules appear to have been intact. In the first case the opacities extended into the softened, hypermature cortex, but in the second the lens cortex was represented only by coagulated morgagnian fluid. In neither case was there any polymorphonuclear reaction around the lens substance. Straub attributed the mononuclear infiltration of the uveal tract to absorption of this hypermature lens material, hence his term "absorption lymphocytosis." However, from what has since been learned of the pathology of uveitis, it is clear that these lens changes were secondary to the uveal inflammation, and that these two cases represent what we now call nongranulomatous uveitis.

The last two cases are in a different category, and both present almost completely

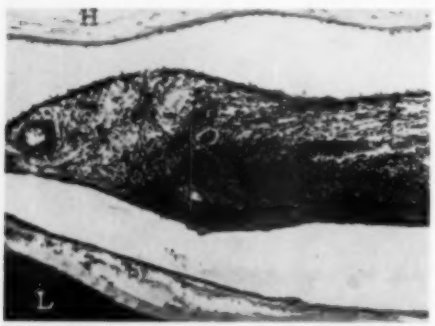

Fig. 8 (Woods). Nongranulomatous uveitis reaction (Straub).

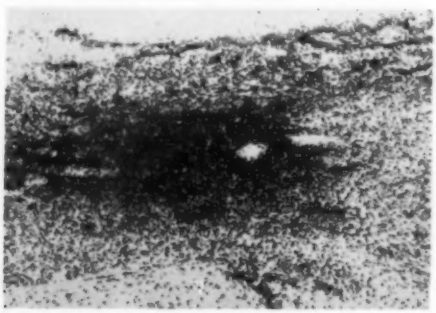

Fig. 9 (Woods). Nongranulomatous uveitis reaction (Straub).

convincing evidence of the truth of the hypothesis of a lens-induced uveitis. The first was a patient with a cataract which gradually became hypermature. After an absence of some years, she suddenly returned to Dr. Straub's clinic with a severe uveitis in this eye. Vision was reduced to light perception, the eye was painful, did not respond to conventional therapy, and was therefore enucleated. Straub's description of the histology of this eye is that of a typical nongranulomatous uveitis, exactly similar to that already mentioned. In addition, however, there was a break in the posterior lens capsule. Around this break, over the exposed lens fibers and extending along the damaged fibers well into the lens substance, was the typical leukocytic reaction seen in endophthalmitis phacoanaphylactica (fig. 12). In this case it would appear that the nongranulomatous inflammation throughout the uvea might well have been precipitated by the localized reaction around the break in the lens capsule. Certainly, both reactions were present in the same eye.

The last case was a patient with bilateral cataracts and uveitis. Although the inflammatory reaction improved, the keratic precipitates persisted. A diagnosis of "phacogenetic" uveitis was made and operation advised by Straub "under circumstances which had been believed unfavorable in the past." Both cataracts were successfully extracted,

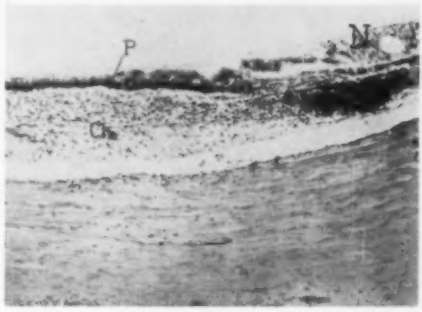

Fig. 11 (Woods). Nongranulomatous uveitis reaction (Straub).

the bilateral uveitis quieted, and the patient was discharged with good vision.

In the entire monograph the only mention of any immune reactions are in the case of the patient who showed a marked postoperative reaction in one eye and no reaction when the second eye was operated, and in one other patient who was given one therapeutic injection of pig's lens in the hope of stimulating an antitoxic effect. In no case was consideration given to the possibility of sensitization to lens protein. Yet Dr. Zeeman wrote me that Straub was well aware of Uhlenhuth's discovery of the organ-specific properties of lens protein, and of Roemer's contemporary work in which he endeavored to establish some relationship between these peculiar antigenic properties of lens protein and ordinary senile cataract. It is also notable

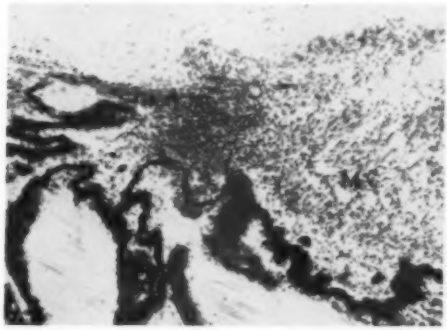

Fig. 10 (Woods). Nongranulomatous uveitis reaction (Straub).

Fig. 12 (Woods). Case 15. Nongranulomatous uveitis plus endophthalmitis phacoanaphylactica reaction (Straub).

that nowhere in this monograph was there any mention of investigations which might establish the existence of a toxic element in disintegrating lens protein, or any experimental evidence to demonstrate hypermature lens material may be irritating or toxic in the eyes of animals. These omissions were specifically noted by Dr. Zeeman for in his letter to me he said that he considered an investigation of the possible toxicity of the various amino-acids of the lens would have been a most interesting and possibly profitable research, but that the lack of laboratory facilities and personnel in Holland in 1919 made such an investigation impossible. Had Straub lived, and had the chaos of war not made further investigations impossible in Holland during the later years of his life and immediately thereafter, these now obvious omissions might have been rectified.

Whether further investigations will prove or disprove Straub's conclusions on the toxicity of lens protein remains to be seen. Certainly the weight at present is against them. But no pious speculations on this score, or carping criticism of his work, can detract from the originality or the importance of the observations he made. He must be given credit and priority for the following:

1. He was the first to bring convincing histologic evidence for the existence of lens-induced uveitis, irrespective of whether its pathogenesis be a toxic or a hypersensitive reaction.

2. He recognized and described the clinical and histologic pictures of what was later known as endophthalmitis phacoanaphylactica six years before it was described and an etiology assigned to it by Verhoeff and Lemoine.

3. He recognized lens-induced uveitis in the second eye occurring after a cataract extraction in the fellow eye, decades before it was described by Courtney, and he differentiated it from sympathetic ophthalmia.

4. He was the first to demonstrate that lens-induced uveitis could be cured by the extraction of the ipsolateral cataract.

5. He was the first to describe accurately the histology of what we now know as nongranulomatous uveitis and to differentiate it from uveitis caused by infection.

Professor Weve describes Straub as a man bubbling over with original ideas. He tells how, when he was Straub's assistant, he met him each morning at the front door, and for five minutes was alone with him as they made their way to the clinic. And in those five minutes, each morning, he recounts how Straub would produce enough suggestions for new approaches to the problems of ophthalmology to keep an ordinary team busy for months! One may well believe it!

How unfortunate it is that the postwar chaos in Europe prevented the proper distribution of this remarkable monograph and the dissemination and appreciation of Straub's contribution! Had it been realized in 1919 that lens-induced uveitis in the second eye was a clinical entity, was quite distinct from sympathetic ophthalmia, and that this form of uveitis could be completely cured by the simple procedure of extraction of the lens in the affected eye, how many eyes might have been saved!

His arguments for the toxicity of lens protein and his belief in this may ultimately be substantiated, but more probably will be disproven. This is of relatively little importance. What is important is that he made fundamental observations years before they were recognized by later ophthalmologists. For these reasons his monograph deserves a place among the Classics, and he ranks a place among the Elite of ophthalmology.

The Johns Hopkins Hospital (5).

PATHOLOGY OF A COTTON-WOOL SPOT*

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Duke-Elder[1] writes that cotton-wool spots of the retina are "soft masses of irregular shape, greyish-white appearance with fluffy margins. They lie within oedematous areas with preference for the central regions, particularly near the disk; they may lie underneath the vessels or may cover them over and obscure them and they are occasionally associated with hemorrhages. If the patient survives they gradually become absorbed, and finally fade away completely by leaving behind no trace."

The accumulation of peculiar corpuscles within edematous areas of the nerve-fiber layer of the retina is known to be the histologic equivalent of the cotton-wool spots. These corpuscles are known in the literature as "cytoid bodies" since they may look somewhat like cells. The nature and development of these so-called cytoid bodies has not been completely understood. Some of the older authors considered them the result of nerve fiber degeneration[2,3] (varicose or ganglio-forme swellings of nerve fibers). Others have said that the cytoid bodies develop from interfibrillar exudate,[4] blood,[5] necrotic mononuclear macrophages (phagocytes),[3] or degenerating glial cells.[6] In an earlier paper I have reported the results of our histologic studies of clinically observed cotton-wool spots in diabetic retinopathy. I found the cytoid bodies in the cases presented to represent different stages of the development and degeneration of so-called terminal swellings of Cajal of interrupted neurites in the nerve fiber layer.[7]

This paper represents the detailed histologic study of a large cotton-wool spot which was an unusual finding in the retina of an eye with open-angle glaucoma.

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Case history

This 78-year-old white man was treated in this Eye Clinic from 1944 to 1956 for open-angle glaucoma. This diagnosis was made by a somewhat increased intraocular pressure, O.U. and confirmed by gonioscopy, positive 24-hour tension studies and positive water-drinking tests. The patient was treated all the time with pilocarpine eye drops and in the last year of his life with Diamox tablets. He was not very well controlled between 1952 and 1956. However, no eye surgery was done because the patient had been found to have a carcinoma of the rectum. When the patient was seen for the last time before his death on February 22, 1956, his vision was: O.D., 6/25; O.S. 6/12. His intraocular pressure then was: O.U., 27 mm. Hg (corrected Schiøtz). His anterior chambers were of about normal depth. His pupils showed extreme miosis and he had some early cataract, O.U. The fundus could not be seen and it seems that it had not been seen for some years before. His visual fields showed some peripheral loss and enlarged blind spots, O.U. The patient died on June 13, 1956, of metastasizing adenocarcinoma of the rectum. It may be important to mention that this patient had high blood pressure for many years: for an example on June 8, 1955, it measured 205/110 mm. Hg. He was treated with restriction of salt and Serpasil. In 1952 and 1953, the patient had repeated rectal bleeding which required many blood transfusions. He also had a number of surgical procedures including a combined abdominal-perineal resection of the rectum in 1953. When the patient came to the eye clinic for the last time before his death he was very cachectic. However, it is not certain that the patient was anemic before his death since he died outside of the hospital.

After his death both eyes were injected with ammonium bromide formalin (Cajal solution) and obtained for histologic examination at post mortem.

Method of histologic examination

The upper halves of both eyes were imbedded in paraffin, cut in serial sections and stained with hematoxylin-eosin. Of the other half of the left eye the retina with a clearly visible cotton-wool spot next to the disc was isolated for this study. Flat sections of the retina were made on the freezing microtome. The method of double impregnation and without reduction of del Rio Hortega[8] was used to stain these frozen sections.

All illustrations of this paper (except for

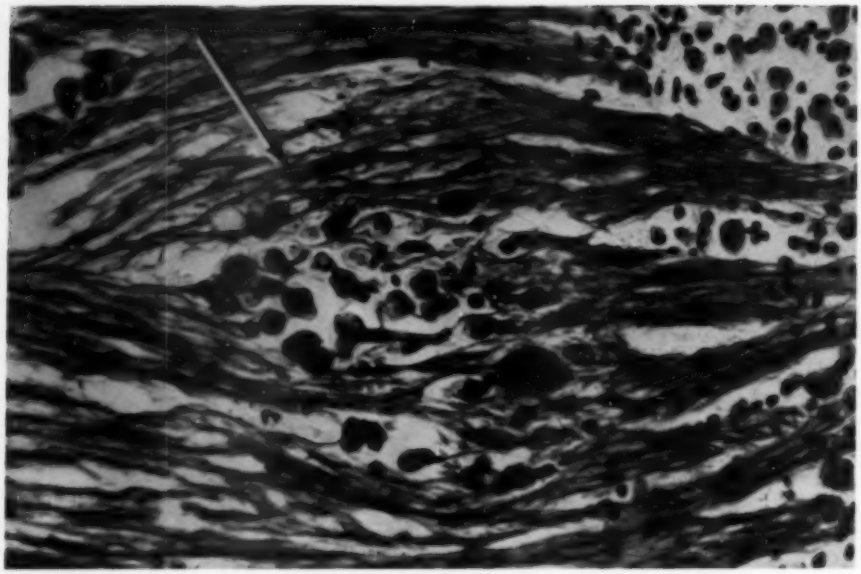

Fig. 1 (Wolter). Flat section through the nerve-fiber layer of the retina next to the optic disc where a cotton-wool patch had been seen macroscopically. The neurites of the nerve-fiber layer show interruption in one area (arrow) and are replaced by an accumulation of terminal swellings of Cajal. Edema is seen around these corpuscles. Some ganglion cells are seen in the upper right corner of the picture. (Frozen section, Hortega method, photomicrograph.)

the drawing, fig. 6) are unretouched photomicrographs.

Histologic findings and discussion

Macroscopically both eyes were of normal size and shape. The anterior chambers were of about normal depth and the lenses were in their normal position. The pupils were miotic. The posterior part of the vitreous was liquefied in both eyes and a ring-shaped formation of abnormally dense vitreous was found attached to the peripheral retina. In the retina of the left eye an oval grayish-white spot with fluffy margins could clearly be seen with a loupe in an area temporal to and near the disc (about one disc diameter from the disc margin). This obviously represented a cotton-wool spot of the retina.

The microscopic examination of the left eye of this patient revealed the corneal epithelium to be continuous. Bowman's membrane, the stroma, Descemet's membrane, and the endothelium were normal. The anterior chamber was of about normal depth and the filtration angles were open. Special staining techniques revealed very extensive nerve-fiber pathology in the trabecular meshwork of this eye and thickening of the trabeculae as well as proliferation of the endothelium of the trabecular meshwork. These findings are reported in another paper.[9] This iris was normal. The ciliary body showed some fibrosis and hyalinization of its stroma and of the ciliary processes. The peripheral retina exhibited cystoid degeneration. The central retina showed some atrophy of the nerve-fiber layer and a distinct decrease of the number of neurons in the ganglion cell layer. This was most advanced in the periphery. The outer layers of the retina showed virtually no atrophy. The results of the special staining techniques in the retina and optic nerve will be discussed later in the paper. No distinct glaucomatous cupping of

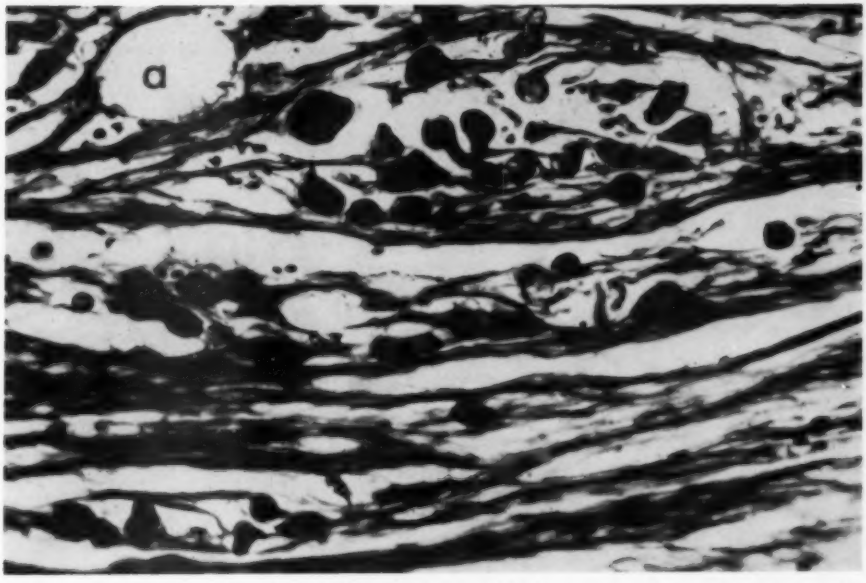

Fig. 2 (Wolter). Flat section through the retinal area with the cotton-wool spot at low power. Many neurites of the nerve-fiber layer are seen to be interrupted and exhibit terminal swellings of Cajal. Edema (a) is seen in this area of the nerve fiber layer. (Frozen section, Hortega method, photomicrograph.)

the disc was found. However, the optic nerve was somewhat atrophic. The choroid was small and atrophic. The sclera was normal.

The histologic studies of the retina of this eye with the silver carbonate techniques[8] allowed for a number of interesting observations. The most interesting findings were made in the retina temporal to the disc where a cotton-wool spot had been seen macroscopically.

Figures 1 and 2 represent flat sections through the nerve fiber layer of the retina in the area in which the cotton-wool spot had been seen macroscopically. Both pictures show some of the neurites of the nerve fiber layer to be interrupted and replaced by dark-staining corpuscles of irregular shape. Edema of the nerve fiber layer is seen in the same areas.

Figures 3, 4, and 5 represent microscopic views of parts of the two first figures at higher power. These three pictures show more details of the corpuscles in the nerve fiber layer and they leave no doubt that the corpuscles represent the formations commonly known as "cytoid bodies." In the same pictures it can be seen that most of these corpuscles are on one side connected with the stumps of interrupted nerve fibers of the nerve fiber layer. The corpuscles actually represent bulblike terminal swellings of these nerve fiber stumps. Especially Figure 3 shows this fact very clearly.

All the photomicrographs (figs. 1 through 10) are mounted in such a way that the optic disc would be on the left side of the pictures. Considering this fact it can be said that all the terminal swellings of the nerve-fiber stumps in these pictures point towards the optic disc. The stumps of interrupted neurites with the bizarre terminal swellings was all that had remained of the involved nerve fibers. Other nerve fibers next to the interrupted ones, however, were seen to be continuous (figs. 1 through 5).

Terminal swellings of interrupted nerve

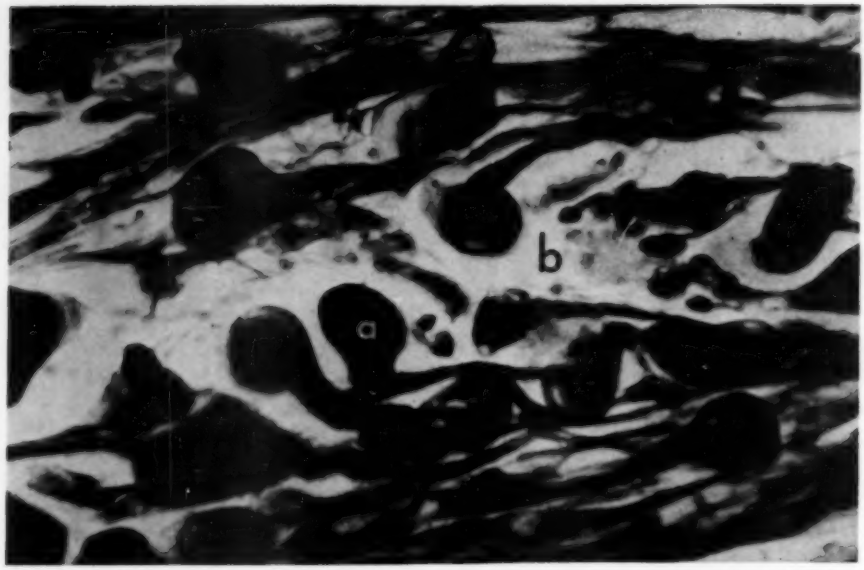

Fig. 3 (Wolter). High-power view of the interrupted nerve fibers with terminal swellings of Cajal (a). The optic disc would be to the left side of the picture. Edema is seen between the nerve fiber stumps (b). (Frozen section, Hortega method, photomicrograph.)

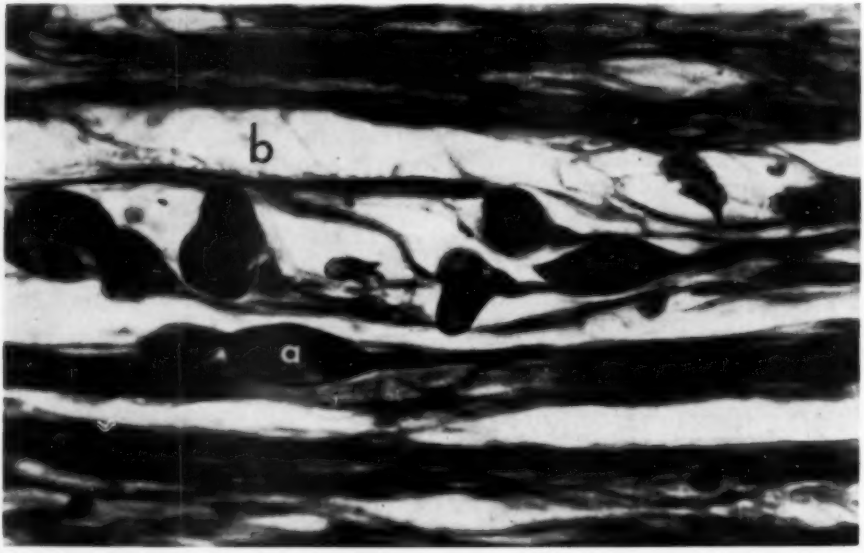

Fig. 4 (Wolter). High-power view of another group of nerve fiber stumps with terminal swellings of Cajal (a) in the area of the cotton-wool spot. Edema is seen around the interrupted nerve fibers (b). (Frozen Section, Hortega method, photomicrograph.)

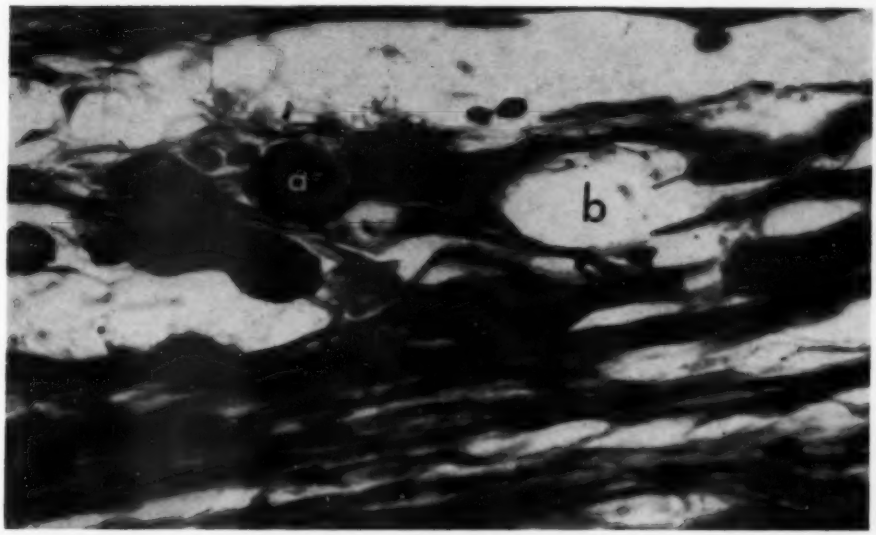

Fig. 5 (Wolter). An area of the nerve-fiber layer within the cotton-wool spot at high power showing terminal swellings of Cajal (a) some of which are not seen in connection with nerve fiber stumps. There is edema of the nerve fiber layer (b). (Frozen section, Hortega method, photomicrograph.)

fibers are very well known from the pathology of other parts of the human nervous system. They were first understood in their nature and development by Cajal and are therefore often called Cajal bulbs. The facts found by Cajal are briefly that a neurite which suffers some kind of damage at a certain point (figs. 1 and 6) may become interrupted at the site of the damage if the latter is severe enough. A damage causing such an interruption may be of any kind—a cut, compression, or ischemia, for example. The part of the neurite which is proximal to the area of injury and resulting interruption

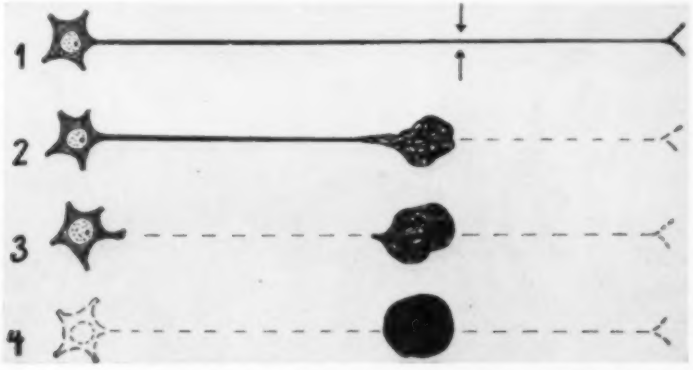

Fig. 6 (Wolter). Drawing, demonstrating the phases of development and dissolution of terminal swellings of Cajal. (1) The arrows indicate the area of damage to the neurite. (2) Interruption of the neurite and formation of a terminal swelling at the end of the stump. (3) Retrograde degeneration results in dissolution of the stump of the neurite, the terminal swelling remains for some time. (4) The terminal swelling also becomes either liquefied or hyalinized, retrograde degeneration extends to the ganglion cell.

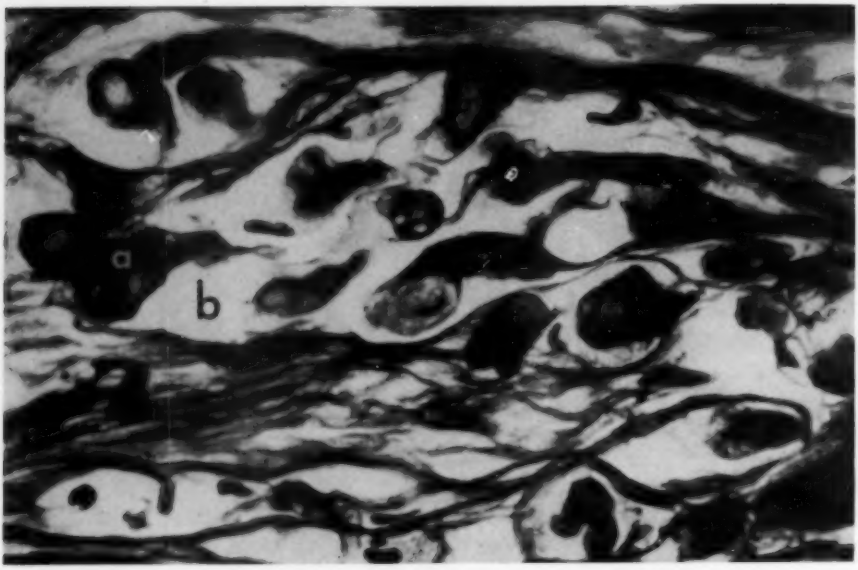

Fig. 7 (Wolter). Terminal swellings of Cajal (a) in all stages of dissolution in an area of the nerve fiber layer exhibiting the cotton-wool spot. Edema is seen between the corpuscles and nerve fibers. (Frozen section, Hortega method, photomicrograph.)

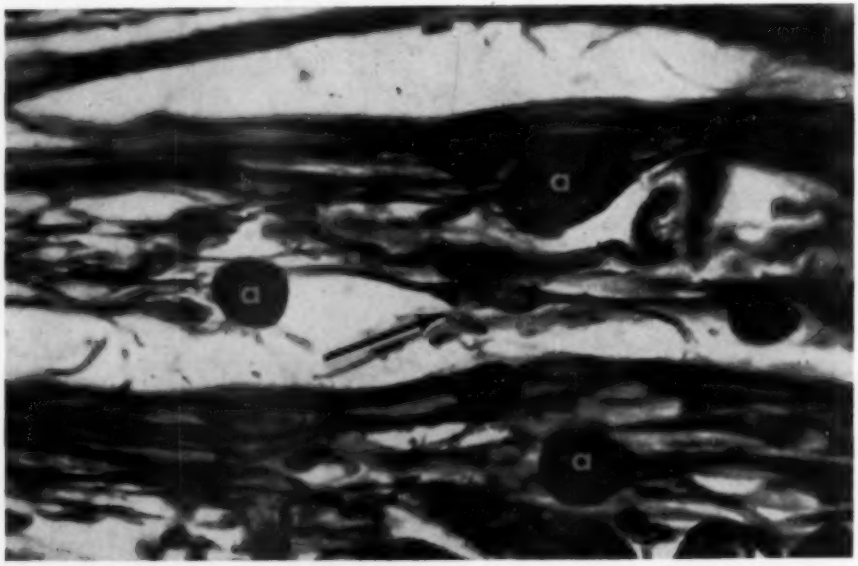

Fig. 8 (Wolter). Remaining terminal swellings of Cajal of the cotton-wool spot which show hyalinization (a). One fiber in the picture (arrow) shows spindle shaped swelling, the earliest change in the development of terminal swellings. (Frozen section, Hortega method, photomicrograph.)

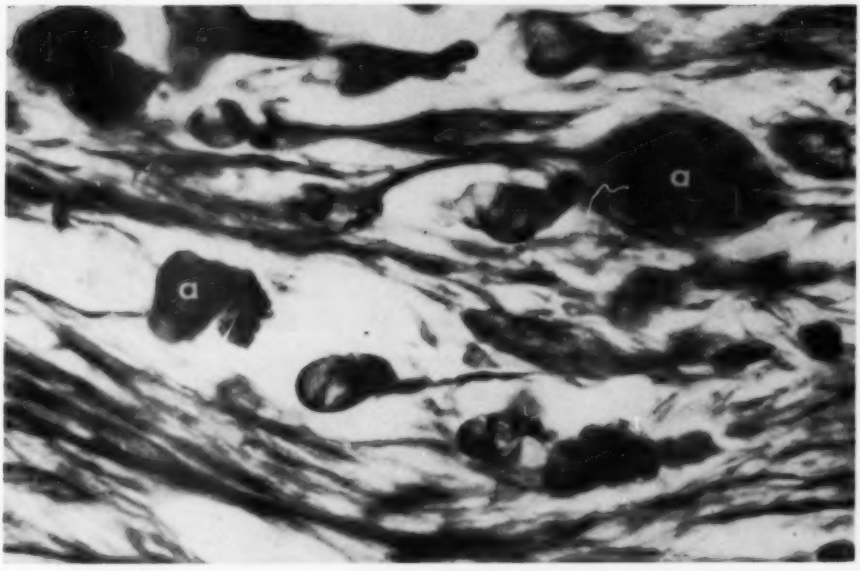

Fig. 9 (Wolter). More advanced stages of terminal swellings of Cajal in the cotton-wool spot. Parallel sections stained with a fat stain showed that many of these corpuscles (a) took fat stain. There is extensive edema of the nerve fiber layer in this area. (Frozen section, Hortega method, photomicrograph.)

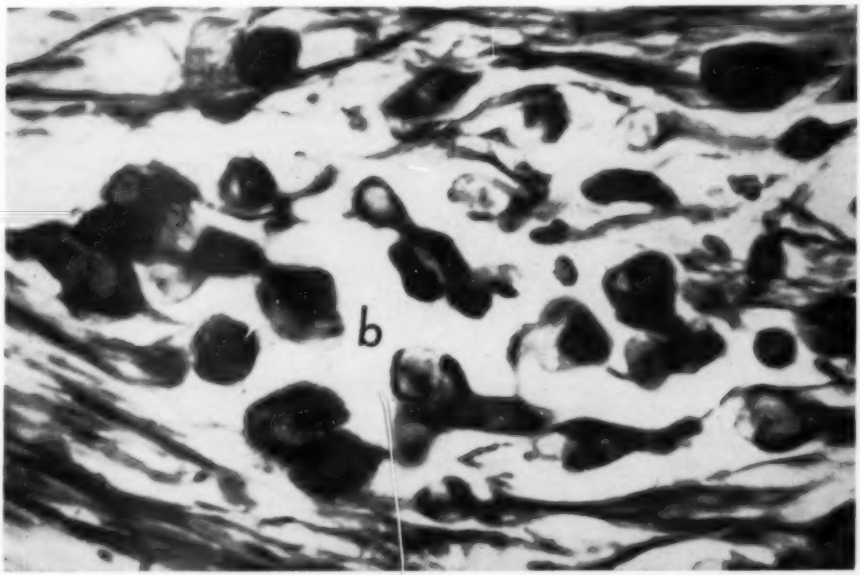

Fig. 10 (Wolter). Terminal swellings of Cajal in a cotton-wool spot showing all stages of dissolution. Edema is seen in the spaces (b). (Frozen section, Hortega method, photomicrograph.)

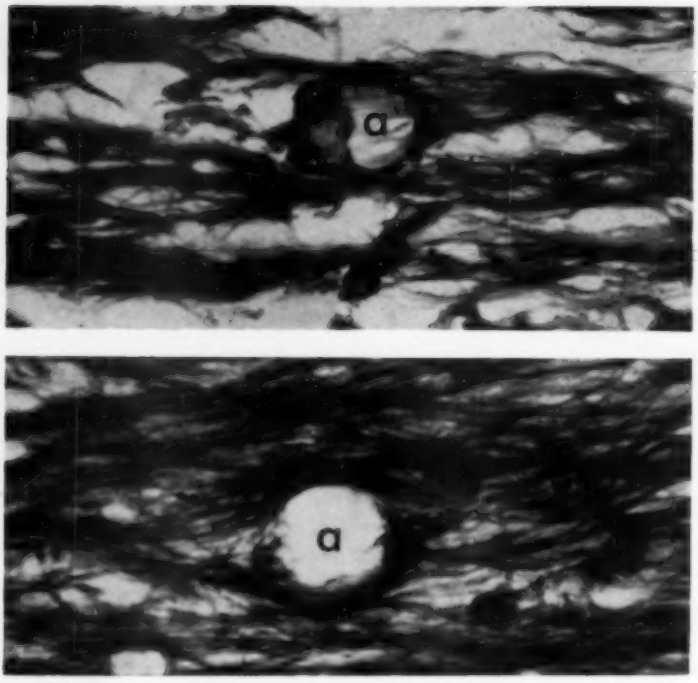

Fig. 11 (Wolter). Isolated occurrences of terminal swellings in different stages of development (a) in the retina of the left eye of this patient. (Frozen section, Hortega method, photomicrograph.)

will soon become atrophic. The distal stump, however, which is still in connection with the ganglion cell will survive and soon develop a peculiar bulblike swelling at its end. The drawing (fig. 6) illustrates the different phases of this process.

In many nerve fibers of the peripheral nervous system the formation of such end-bulbs is the first phase of regeneration. I believe that the patchlike formations of terminal swellings of nerve-fiber stumps in cotton-wool spots must be caused by some kind of local damage involving groups of nerve fibers. I think that ischemia most likely represents this local damage in the nerve-fiber layer and might therefore be considered the primary cause of cotton-wool spots.

From observation of different stages of the development of terminal swellings of Cajal in cotton-wool spots of the human retina we know that most of the terminal swellings will disappear after some time. This is explained by the process of retrograde degeneration of the remaining nerve fiber stumps and finally also of the ganglion cells. Usually the distal parts of the nerve fibers are first to disappear (figs. 3, 6, 8, and 10). The terminal swellings usually remain for some time as isolated bodies and will in this phase give a positive fat stain. These free bodies can be seen in all phases of dissolution (fig. 10). And finally no trace of them will be left. Some of the terminal swellings, however, may become hyalinized and will then remain in the retina (figs. 8 and 12). I have reported in other papers that such hyaline bodies (amyloid bodies) of the retina may be found as the end-result of degeneration of nerve fibers,[10] ganglion cells,[11] or glia[12] in the human retina.

The retina of this eye showed not only

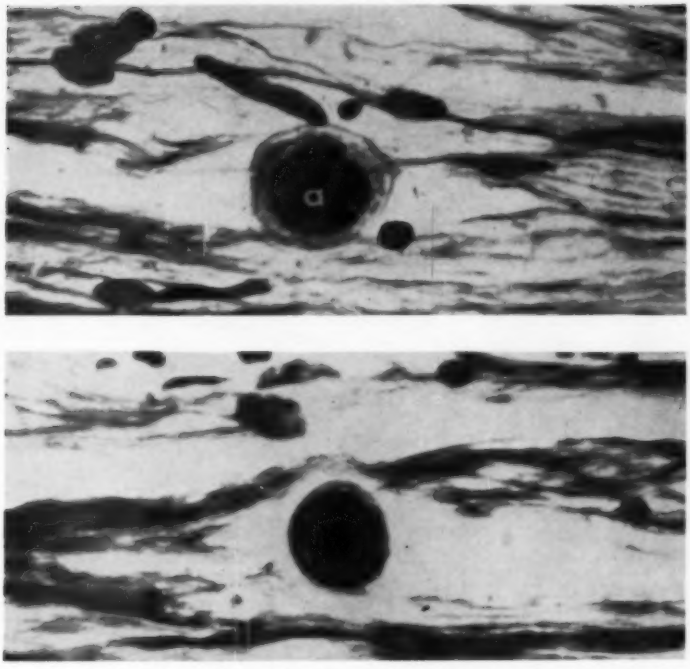

Fig. 12 (Wolter). Isolated hyaline bodies (a) of nerve fiber origin in atrophic areas of the nerve fiber layer of this left eye. (Frozen section, Hortega method, photomicrograph.)

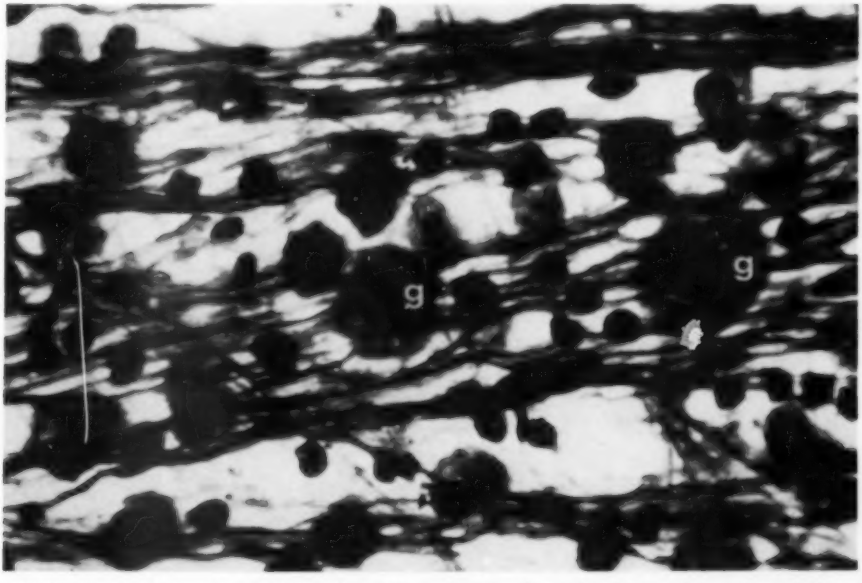

Fig. 13 (Wolter). Flat section of the central retina with ganglion cells of large (g) and small sizes and some nerve fibers. (Frozen section, Hortega method, photomicrograph.)

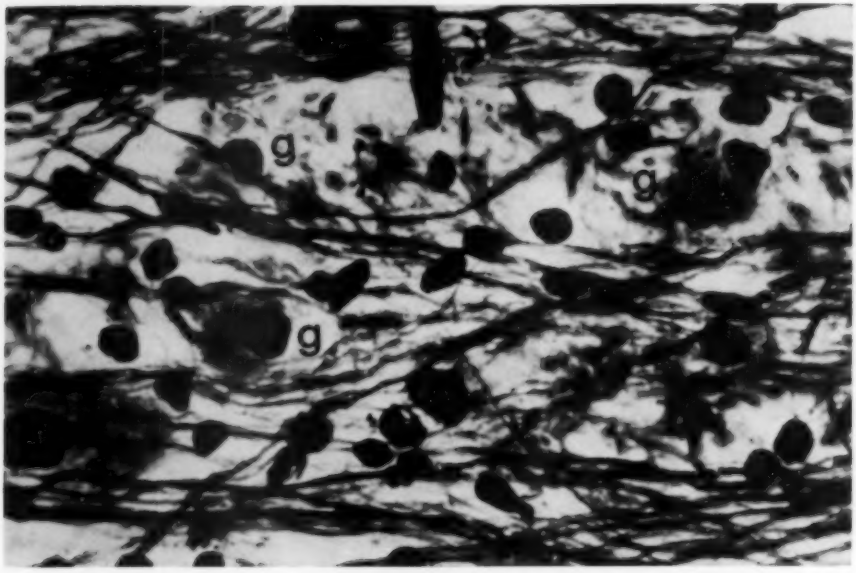

Fig. 14 (Wolter). Another area of ganglion cells (g) of the central retina which show extensive degeneration. (Frozen section, Hortega method, photomicrograph.)

Fig. 15 (Wolter). Low-power view of longitudinal section of optic nervehead showing the nerve fiber bundles with many terminal swellings in different stages of dissolution (arrows). (Frozen section, Hortega method, photomicrograph.)

the localized patchlike degeneration of nerve fibers next to the optic disc which had resulted in the formation of the cotton-wool spot; there was also a more diffuse destruction of nerve fibers which had resulted in the development of isolated terminal swellings in different stages of development and dissolution (fig. 11) and in diffuse hyaline bodies all through the nerve fiber layer (fig. 12). There was a distinct decrease of the number of nerve fibers in the nerve fiber layer (figs. 13 and 14) and also a decrease of the number of ganglion cells all through the retina. Furthermore there were all stages of degeneration seen in the neurons of the ganglion cell layer (fig. 14).

The process of this nerve-fiber degeneration with interruption and formation of terminal swellings of Cajal in this case was not

Fig. 16 (Wolter). Terminal swellings of Cajal of nerve fibers within the lamina cribrosa of the optic disc of this eye. (Frozen section, Hortega method, photomicrograph.)

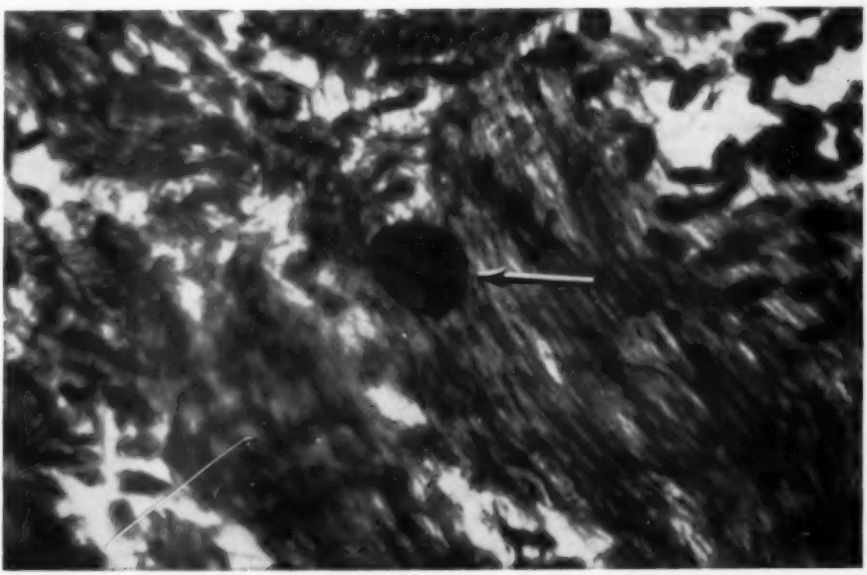

Fig. 17 (Wolter). Hyaline body of nerve fiber origin in the nerve fiber bundles of the optic nervehead in this case. (Frozen section, Hortega method, photomicrograph.)

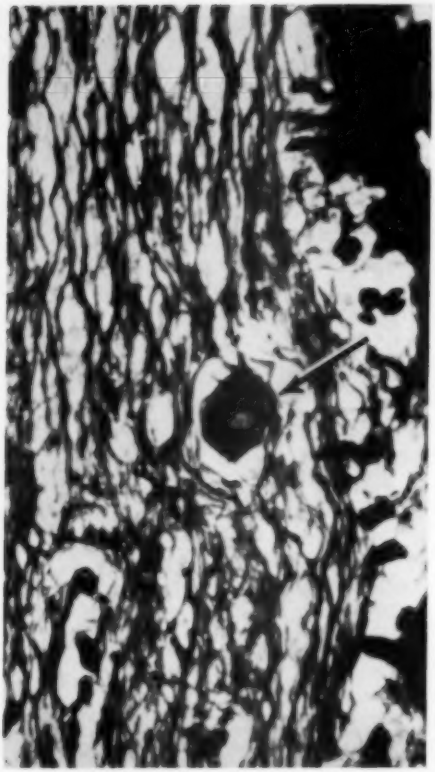

Fig. 18 (Wolter). Terminal swelling of Cajal in the optic nerve of this case (arrow). (Frozen section, Hortega method, photomicrograph.)

at all limited to the retina. Diffuse terminal swellings were also seen in the disc and in the optic nerve.

Figure 15 shows a low-power view of a longitudinal section through the nerve-fiber bundles of the optic nerve right behind the lamina cribrosa of this case. Numerous terminal swellings in different stages of dissolution can be seen. Some of them were found to give a positive fat stain.

Figure 16 shows cell-like terminal swellings of nerve fibers within the lamina cribrosa. Figure 18 shows another corpuscle of this kind in the optic nerve itself. Figure 17 shows that some of these corpuscles in the optic nerve were also seen to have become hyalinized and to remain in the tissues. Figure 19 shows that there definitely was optic nerve atrophy in this case with increase of the mesodermal septal tissues and decrease of the number of nerve fibers.

Comment

Conclusions drawn from the above-described findings are:

The so-called cytoid bodies of the cotton-wool spot in the retina of the present case were again found to be terminal nerve-fiber swellings of Cajal in different stages of their development and dissolution. The terminal swellings were found at the end of nerve-fiber stumps of neurites of the nerve-fiber layer and they were directed towards the optic disc. The accumulation of these swellings together with surrounding edema of the nerve fiber layer is considered to cause the whitish color of cotton-wool spots. It is im-

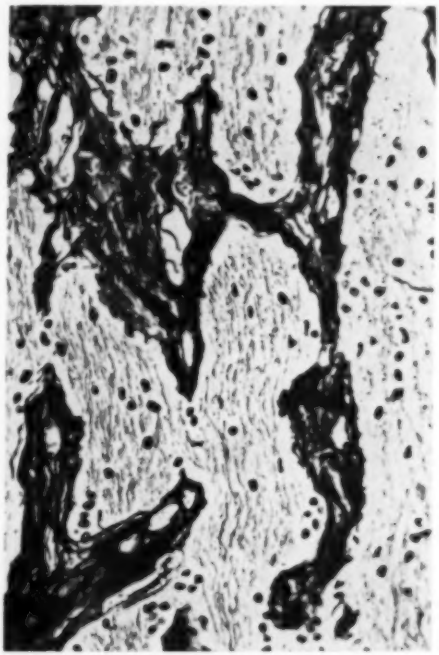

Fig. 19 (Wolter). Low-power view of a longitudinal section of the optic nerve showing some optic nerve atrophy. The septal structures (black) are increased in thickness. (Frozen section, Hortega method, photomicrograph.)

portant to emphasize that only some of the nerve fibers in the area of the cotton-wool spot were found to be interrupted while many others were seen to run continuously through the lesion.

Different stages of retrograde degeneration of the nerve stumps with the terminal swellings were seen. This fact explains why cotton-wool spots usually disappear. Some of the terminal swellings, however, showed hyalinization. I should like to emphasize that the formation of terminal swellings of Cajal in the nerve fiber layer of the retina is a completely nonspecific finding which can be observed under many pathologic conditions.

The occurrence of a cotton-wool spot in the retina of this eye with long-standing open-angle glaucoma is a somewhat unusual finding. However, it must be emphasized that this patient was cachectic and may well have been anemic before he died of the metastasizing carcinoma. He was also known to have had hypertension. The hypertension and the probably present anemia may have contributed to the development of the described cotton-wool spot in the patient's left eye.

It is our impression that cotton-wool spots of the retina of the pathologic nature here described actually are small incomplete infarcts of the inner retina.

It is realized that this paper has its shortcomings. It does show that the terminal swellings of nerve fiber stumps of the nerve fiber layer form the bodies which were called cytoid bodies in the literature. However, the peculiar staining properties of the "pseudonucleus" and the "pseudocytoplasm" of the "cytoid bodies" cannot yet be explained.

In conclusion I should like to state that the view that "cytoid bodies" are of nerve-fiber origin certainly is not new. This has been the classical conception. However, more recent authors have doubted the old explanation. There is reason to share and to re-emphasize the classical view on this subject. Furthermore it seems important to relate the retinal changes in cases with cotton-wool spots to very similar findings known from general neuropathology.

Summary

A cotton-wool spot in the eye in a case of bilateral open-angle glaucoma was studied histologically with a special stain for nerve fibers. The cotton-wool spot was found to be composed of an area of edema and many terminal swellings (Cajal) of interrupted neurites in the nerve fiber layer of the retina.

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IMPROVED HAND FUNDUS CAMERA

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The hand fundus camera designed by Noyori‡ in 1956 has proved useful for routine fundus photography, and particularly for bed-ridden patients. The size of film used by this earlier model (16 mm.) made it inconvenient to make slides and to process. The design of the hand fundus camera has been improved so that regular 35-mm. film may be used (fig. 1). In addition, the pictures obtained are sharper, more brilliant and cover a field almost as large as that of the non-portable models now on the market.

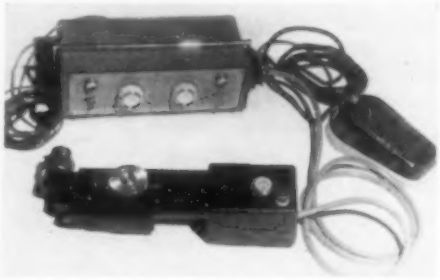

Fig. 1 (Noyori and Baba). Improved hand fundus camera with a transformer and a foot-switch.

With this new camera, fundus pictures are taken without difficulty once the light pattern (a brilliant slit target as is shown in Figure 6) has been projected and focused precisely on the fundus. The photograph is taken with electronic flash illumination.

OPTICAL SYSTEM OF THE CAMERA

The optical system is composed of a photographic system (A), a viewing system (B), and an illuminating system (C), as is shown in Figure 2.

The fundus is illuminated by a beam of light having origin at the pilotlamp (a small incandescent bulb) (1). This beam passes through a speed light bulb (2), a pair of condenser lenses (3 and 4), and a right angle prism (5).

The main part of the beam of light coming from the fundus is reflected by a semi-reflecting prism (6) and enters the photographic system (A). The first lens in sys-

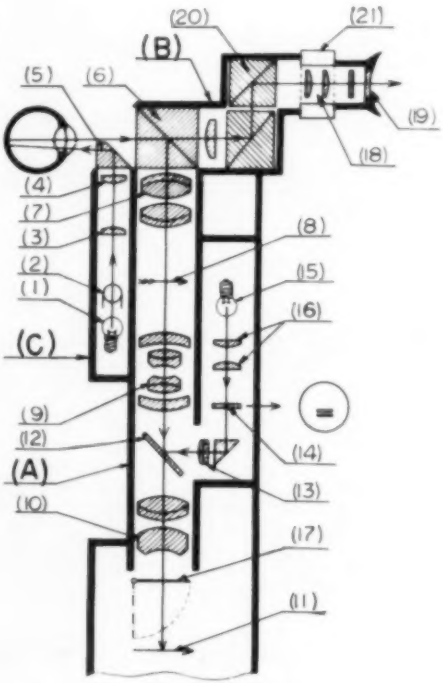

Fig. 2 (Noyori and Baba). Optical system.

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‡ Noyori, S.: Hand Fundus Camera. Am. J. Ophth. **42**:639, 1956.

tem A (7) brings about the formation of an image at the position of the arrow (8). The position of this image varies according to the refractive state of the patient's eye. When the anterior focal point of lens (9) and this image (8) are made to coincide by the movement of the lens (9) up and down, the beam of light passing through this lens will be collimated. A third lens (10) then focuses the parallel rays from the second lens (9) on the film plane (11).

The photographic field covers about 25 degrees (about four disc diameters). In system A each lens is composed of a compound lens specially designed to minimize the aberrations of the patient's eye, especially chromatic aberration.

The target (14) which is focused on the retina is illuminated by the bulb (15). This beam passes through a pair of condensing lenses (16). Utilizing a right angle prism and the glass plate (12), this beam is directed through the part of optical system A. The target and the film plane are conjugate since lenses 10 and 13 are equivalent.

When the image of the target is accurately focused on the fundus by adjustment of lens (9), the image of the fundus is clearly focused in the film plane. The lens (9) is readily moved by rotating the wheel on the side of the camera as shown in Figure 5.

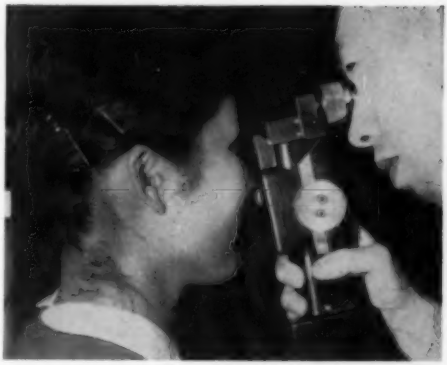

Fig. 4 (Noyori and Baba). Taking a picture.

The viewing system is composed of ocular lenses (18), a compensating lens (19), and a porro prism (20). This is essentially a telescopic system which enhances viewing. The area viewed on the fundus is about four disc diameters in diameter. A patient's fun-

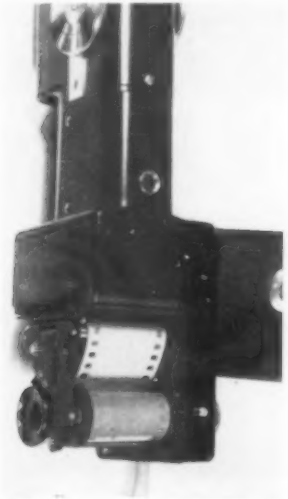

Fig. 3 (Noyori and Baba). Film chamber.

Fig. 5 (Noyori and Baba). Turning the focusing wheel.

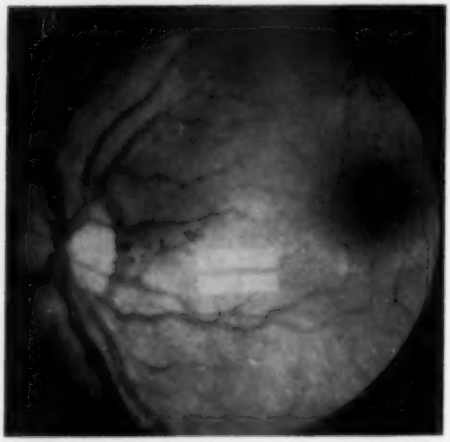

Fig. 6 (Noyori and Baba). Target is projected on the retina.

dus is focused by moving the ocular lens (18) back and forth by rotating knob (21). The image of the fundus will be seen clearly by the examiner, when the patient's refractive error is corrected.

The camera is designed so as to be conveniently held with one hand. The shutter release is controlled by an electrical footswitch (figs. 1 and 3).

Method of photography

Prior to photography, the patient's pupil should be dilated (at least to seven mm.).

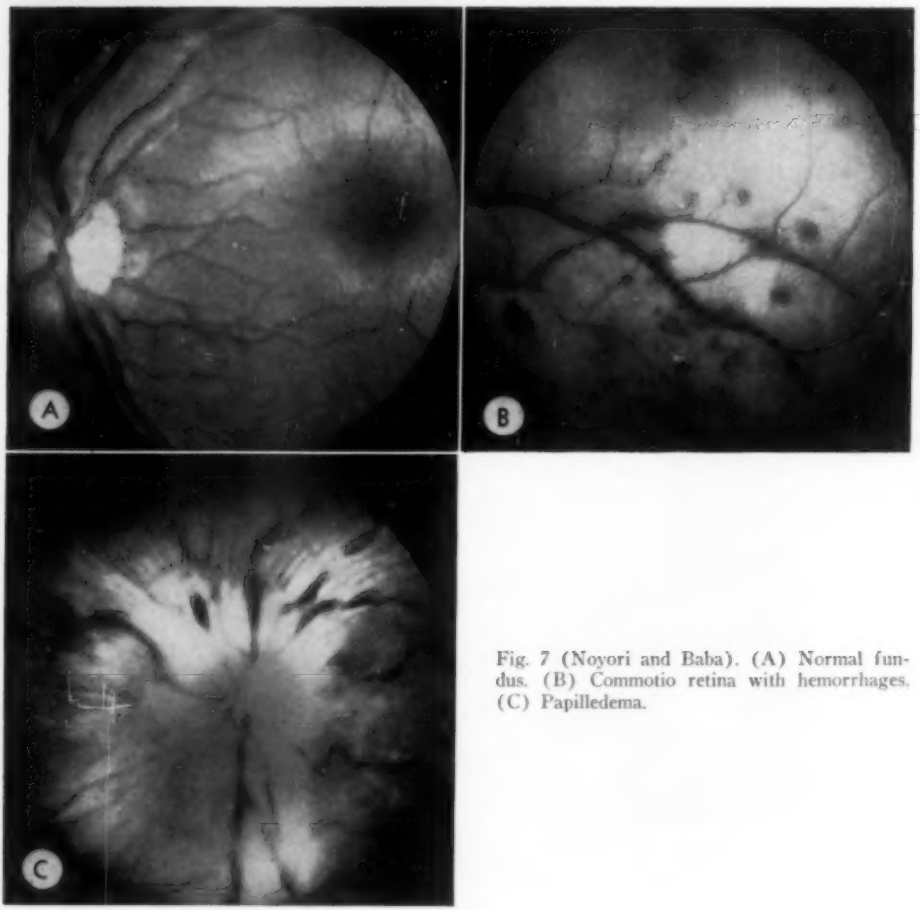

Fig. 7 (Noyori and Baba). (A) Normal fundus. (B) Commotio retina with hemorrhages. (C) Papilledema.

Holding the camera with one hand, the pilot-lamp is switched on to illuminate the fundus. While observing the fundus through the eye-piece the ocular is rotated and adjusted so that the fundus comes into clear view. By this procedure the fundus will remain clearly visible (as in direct ophthalmoscopy) throughout the whole photographic process (fig. 4).

One then rotates the wheel (fig. 5) on the side of the camera with the index-finger until the light pattern (fig. 6) comes into clear view near the center of the field being observed in the patient's fundus. Adjustment is finished when this operation has been completed.

Finally, one steps on the foot-switch which opens the shutter (17), sets off the electronic flash (2), and exposes the film (11). Loading and winding the film are accomplished in the same manner as in an ordinary camera.

Figure 7 shows some pictures of the fundus taken by this camera. The authors used regular 35-mm. colored or black and white film (A.S.A. 10-50).

There is no corneal reflection noted unless the camera is held far away from the patient's eye. It is preferable to keep the distance between the surface of the prism (5) and the cornea less than six mm.

Fig. 8 (Noyori and Baba). Taking picture of rabbit fundus.

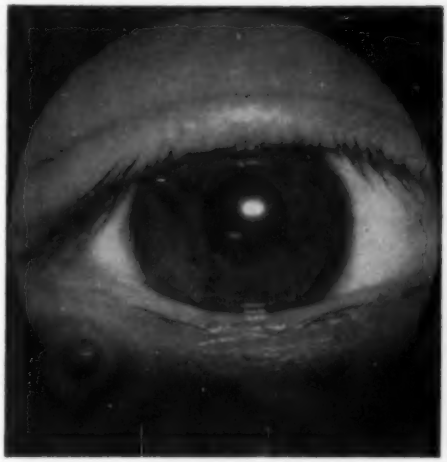

Fig. 9 (Noyori and Baba). Anterior segment of the eye.

Application of the instruments

This camera may be readily used for retinal photography on children, on patients in serious condition (even in coma or general anesthesia), in fundus screening programs, as a routine office procedure, for home or hospital calls, and in animal experiments (fig. 8).

It may also be used as a simple refractometer by merely reading the figure that is indicated on the focusing wheel.

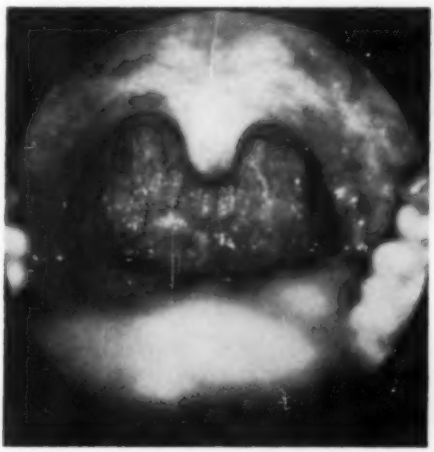

Fig. 10 (Noyori and Baba). Pharynx.

In addition, photographs of the anterior parts of the eye, the mouth, the throat, and the skin can be taken with or without an attachment lens (figs. 9 and 10).

SUMMARY

An improved hand fundus camera has been designed with an entirely different optical system. Excellent 35-mm. black and white or color photographs can be taken readily not only of the eyegrounds but also of the other parts of the body.

640 South Kingshighway (10).

Thanks are due to Dr. Tutomu Sato and Dr. Bernard Becker who kindly supervised our work. The improved hand fundus camera is available in the United States from the American Optical Company.

PLEOPTIC METHODS

IN THE MANAGEMENT OF AMBLYOPIA WITH ECCENTRIC FIXATION

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New York

Bangerter deserves the credit for conceiving pleoptics. He invented this term to designate all methods utilized in the treatment of amblyopia for which he devised many ingenious instruments.* His Pleoptics Schule in St. Gallen, a charming Swiss town south of Lake Constance, soon attracted many ophthalmologists who desired to learn about his methods. Unfortunately, the novelty and complexity of the method, the multitude of intrumentation, and consequent exorbitant expense all stood in the way of a widespread acceptance of his methods. These deterring factors were overcome by one of his visitors, Prof. C. Cüppers, who appreciated the significance of this new approach in treating amblyopia. Cüppers modified the original Bangerter pleoptic technique by devising four simple, inexpensive, easily handled instruments to replace those of the founder of pleoptics. Cüppers' method quickly achieved widespread recognition throughout European clinics.

Despite impressive statistics based on these methods from the Swiss, German, and English ophthalmic centers, ophthalmologists in the United States have not yet readily accepted and utilized pleoptic techniques. This reluctance and apparent disbelief regarding the efficacy of pleoptics are manifest by the remarkable lack of articles in contemporary American ophthalmologic publications. No mention of the existence of a pleoptic clinic in this country could be found in the literature. After one of us (B.S.P.) had visited both Bangerter's and Cüppers' clinics, and saw the impressive results of their methods, he decided to organize a pleoptic clinic at the New York Eye and Ear Infirmary.

The purpose of this article is to review the subject of pleoptic methods in the management of amblyopia with eccentric fixation from the following points of view: theory and practice of Cüppers' method, criteria for the selection of patients, protocol followed at our pleoptic clinic, and the results of treatment.

THEORY AND PRACTICE OF CÜPPERS' METHOD

The two most important instruments used by Cüppers are his visuskop and euthyskop.

* In his monograph entitled *Amblyopie Behandlung* (Karger, 1955), Bangerter described 20 instruments. Recently, he devised a new instrument called the Pleoptophor which combines the functions of several of his earlier instruments.

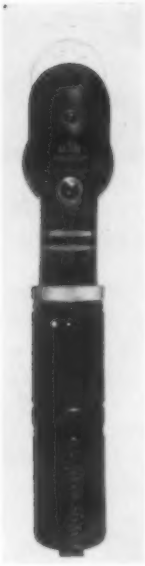

Fig. 1 (Priestley, Byron and Weseley). Front view of visuskop.

A flickering device and his co-ordinator encompass the remainder of his pleoptic instrumentation.*

The visuskop (fig. 1) is an instrument which projects a small black star on the patient's fundus. In a matter of seconds, the presence of centric fixation, or the presence of eccentric fixation and its exact location, can be determined by this instrument. It is used in the same manner as any ophthalmoscope except for the fact that in the visuskop, the apertures for illumination and observation are separate. Lenses are incorporated to correct the ametropia of the patient's eye but not that of the observer, who must wear glasses to neutralize any refractive error. Illumination should be maintained at as low a level as possible to avoid unnecessary stimulation of the observed eye. Cüppers advises the use of a four-volt current for the nine-volt bulb of the instrument.

The visuskop is purely a diagnostic instrument. We believe it is the best method ever devised to diagnose eccentric fixation. After instructing the patient to cover his good eye, the observer focuses the black star on the fovea. The patient is then told to look directly at the star. An eccentric fixer will move his fovea away from the star. The visuskop is also provided with a grid and concentric circles. Either one can be projected on the fundus in order to measure the exact amount of eccentricity. We prefer the use of the circles. The number of degrees of eccentric fixation is measured by counting how many circles lie between the fovea and the site of eccentric fixation (fig. 2). Each circle represents approximately one-half a degree.

The previous methods for diagnosing eccentric fixation were based on observation of the position of the corneal reflex before and after occluding the fixing eye. Figure 3 shows a patient with an exotropia and eccentric fixation where the position of the light reflex does not move after covering the fixing eye. This method was grossly inadequate for the

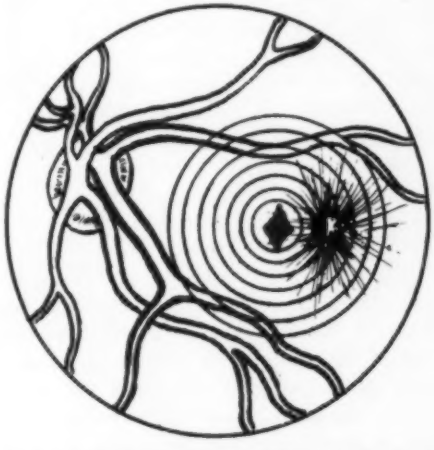

Fig. 2 (Priestley, Byron and Weseley). Measuring eccentricity by concentric circles approximately one-half degree apart.

* Cüppers has recently designed a new Synoptophor which incorporates four additional functions, namely the use of Haidinger brushes, the use of dazzling to produce after-images, the use of an alternating light source, and the capacity to perform perimetry.

Fig. 3 (Priestley, Byron and Weseley). Diagnosing eccentric fixation based on the old method of observing the position of a corneal reflex before and after occlusion of the fixing eye.

diagnosis of parafoveal or erratic eccentric fixation. Consequently, many cases were undiagnosed, and patching of the fixing eye was mistakenly employed.

The euthyskop (fig. 4) is primarily a therapeutic instrument. It is characterized by a bright light, encompassing an arc of 30 degrees, which is projected on the patient's fundus. The center of the light bundle is blocked by a black disc which is aimed at the fovea. The euthyskop has two discs. Either a disc of three degrees or one of five degrees may be rotated into position to protect the fovea from the light source.

When using the euthyskop, the physician does not cover the patient's fixing eye, nor does he instruct the patient to look at the light. The patient is instructed to look at a distant light with his fixing eye to insure steady fixation. When the examiner sees the patient's fovea clearly in the middle of his field of observation, he activates a mechanism which brightly illuminates the parafoveal area but which simultaneously shields the fovea with the black disc.

In cases of esotropia of high degree, difficulty was experienced in the use of the euthyskop due to the narrowness of the space between the nose of the patient and the converging eye. We found it very helpful to put a rotary prism attached to a headband in front of the fixing eye (fig. 5). We could thus bring the eye to be "euthyskoped" in a more easily accessible position. The rotary prism can be moved as a whole in the frame so that it also can compensate for vertical deviations.

The flashing with the euthyskop lasts from 10 to 30 seconds. The fixing eye is then occluded. A positive after-image may or may not appear. Shortly thereafter, a negative after-image usually becomes apparent to the patient who reports that he perceives something resembling an enormous black doughnut with a clear center through which he can see. By using a flickering overhead light (that is, alternate periods of brightness and darkness with variable rhythm), the after-image can be more easily appreciated and its perception can be prolonged. The length of time during which the after-image persists is an index to the severity of the amblyopia. The deeper the amblyopia, the more difficult

Fig. 4 (Priestley, Byron and Weseley). Front view of euthyskop.

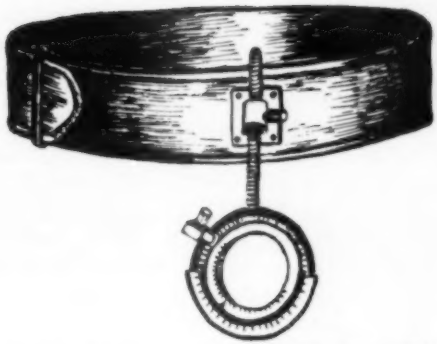

Fig. 5 (Priestley, Byron and Weseley). This rotary prism facilitates euthyskopy in patients with severe esotropia. The headband is placed on the patient's forehead with the prism located in front of the fixing eye.

will it be to produce the after-image and the quicker will it tend to disappear.

After the euthyskop has been removed, the amblyopic eye is exposed to the average room illumination. At this moment, the macu'a will pass from a state of darkness to the stimulation of the surrounding light while the brightly illuminated periphery of the "euthyskoped" retina will pass to a decreased illumination which will be perceived as darkness.

The after-image, its significance, physiology and application to the therapy of amblyopia is the keystone of Cüppers' method. One of the important characteristics of a negative after-image is that it is endowed with the psychologic characteristics of a real object in space. For instance, if we project the after-image produced by a euthyskop against a white surface held in front of the eye, the after-image appears as a circle, If this white surface is now tilted, the after-image assumes the shape of an ellipse (fig. 6). The perception of negative after-images depends upon the same environmental factors as does the perception of real objects on the basis of the subjective gestalt perception. Therefore, the perception of a negative after-image is associated with the function of the highest cortical centers.

In cases of amblyopia with eccentric fixation, real objects are not fixated with the fovea when the good eye is covered or uncovered. The first step in the treatment of eccentric fixation is to induce an after-image by euthyskopy in the amblyopic eye. The center of the negative after-image, which appears subjectively as an object in space, characterizes the position of the fovea. By guiding attention to this zone and substituting it for the eccentric fixation, Cüppers caused a shift in the principal direction of gaze. It is advisable to use a large object such as a Maddox cross as a fixation target in the early stages of treatment. The foveal after-image, which originally was localized laterally, is now interpreted as straight ahead. Thus, the amblyopia with eccentric fixation is converted to amblyopia with foveal fixation.

We believe that the fundamental thera-

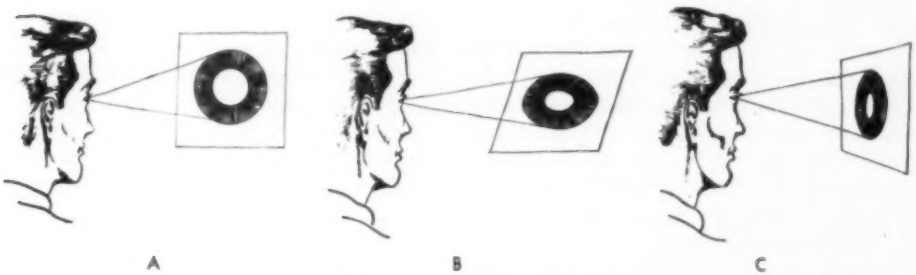

Fig. 6 (Priestley, Byron and Weseley). The perception of the after-image depends upon environmental factors such as the position of the white surface upon which it is projected. In (A) the surface is perpendicular to the visual axis. In (B) the surface is tilted vertically away from the visual axis, whereas in (C) the surface is tilted horizontally.

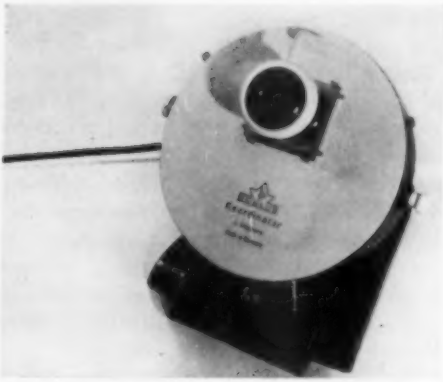

Fig. 7 (Priestley, Byron and Weseley). Front view of co-ordinator.

peutic problem in cases of amblyopia with eccentric fixation is the re-establishment of the physiologic foveal direction of gaze whose spatial value is straight ahead. In many patients, Cüppers observed that the shift in localization passes through an intermediate step of monocular diplopia. This step can be easily recognized by the use of the visuskop. If the black star is projected on the site of eccentric fixation, the patient sees just one image and localizes it straight ahead. However, if the star is projected on the fovea, two images will be seen, one in the direction of straight ahead, and the second, which is brighter, in a different direction.

The fundamental process involved in the substitution of the true fovea for the eccentric focus is not fully known. It is certain that a rivalry develops between the old and new points of fixation. This rivalry may explain why patients frequently manifest relapses of eccentric fixation. This possibility exists until the true foveal fixation acquires dominance over the old eccentric fixation.

Cüppers designed the co-ordinator (fig. 7) to accomplish two purposes:

Firstly, the treatment of amblyopia with eccentric fixation by the utilization of after-images only required too much of the physician's time.

Secondly, the co-ordinator is an ideal instrument to teach patients how correctly to co-ordinate motor with visual spatial projection. The instrument is based upon the entoptic phenomenon of Haidinger's brushes.* When the patient fixates with his parafovea, he perceives a rotating propeller. The attention required to keep the propeller visible is usually enough to effect a shift in localization. Perception of the propeller does not require visual acuity any better than 20/200. In order to see the propeller, the degree of the eccentricity of the direction of gaze must not be greater than five to eight degrees away from the macula. If the original degree of eccentric fixation was less than this five to eight degree value, or if fixation has been brought to within this zone by means of after-image treatments, foveal fixation will be stabilized much faster with the co-ordinator than by employing after-images alone.

When the Haidinger brushes are localized as straight ahead by the patient, he is then taught to re-establish the correct relationship between motor and visual spatial projection. Correct association of the motor function of the hands with the eyes is relearned by instructing the patient to touch an object which delineates the center of the propeller with a pointer held in his hand (fig. 8). During the early phases of treatment, there is a double localization for straight ahead, one which is visual and one which is motor. For example, during fixation exercises for near, a patient fixated on an object inside the negative after-image. Both object and motion were correctly localized as straight ahead. However, when the patient was instructed to touch the object with a pointer, he placed it at some distance laterally to the object (fig. 8).

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* Haidinger brushes are an entoptic phenomenon due to the polarization of light by Henle's fiber layer. It has been used extensively in the study of macular function. Cüppers utilized the foveal position of Henle's fiber layer in designing the co-ordinator.

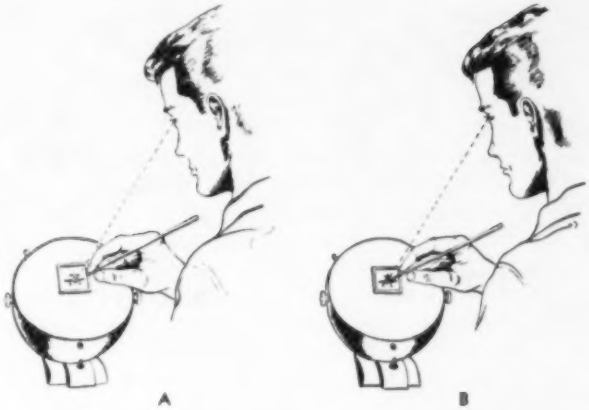

Fig. 8 (Priestley, Byron and Weseley). (A) shows the dissociation between visual and motor projection in the early stage of treatment. (B) shows the two functions properly associated as treatment progresses.

Criteria for the selection of cases

The most important factor in the successful treatment of amblyopic eyes with eccentric fixation is the judicious selection of patients. Among the determining factors in selectivity are: age of patient, intelligence of patient, motivation of patient, type of eccentric fixation, and the presence of fusional vergences. Certainly, the prodigious economic and time factors should not be minimized because in our experience, when parents of potential pleoptic patients are offered the slightest ray of hope, they tend to overlook the expense of these methods and the amount of time required for successful completion of the training.

1. Age of patient

The arbitrary age limits for potential pleoptic patients are from five to 15 years. In individuals younger than five years, the chance of their assiduously comprehending and following instructions militates against their inclusion in the training program. The prognosis for restoration and maintenance of good visual acuity in an amblyopic eye with eccentric fixation in a patient older than 15 years of age is so slight that most authorities feel that the time and money necessary are not worth the gamble. However, it should be stressed that there is no actual upper age limit for utilization of pleoptic methods in unusual circumstances which will be described in the section on screening of patients at the New York Eye and Ear Infirmary.

2. Intelligence of patient

Regardless of the age of any patient, if his IQ level is below normal, he is not considered a suitable candidate for pleoptic training. The span of attention required for euthyskopy, the appreciation of afterimages, and the concentration involved in the use of the co-ordinator, all demand at least average intelligence.

3. Motivation of patient

This factor cannot be emphasized too strongly. If all other considerations are favorable, a patient who does not exhibit alacrity is a poor candidate. Devices must be contrived to instill a sense of competition and accomplishment among the children. Constant encouragement, infinite patience, subtle prodding and conversion of negative to positive attitudes encompass the essentials which contribute to the successful motivation of pleoptic patients. These same measures equally apply to the tacit handling of the parents, who are usually very pessimistic and discouraged about any future cure by the time they are referred to the pleoptic clinic. An understanding parent greatly facilitates the task of the pleoptician.

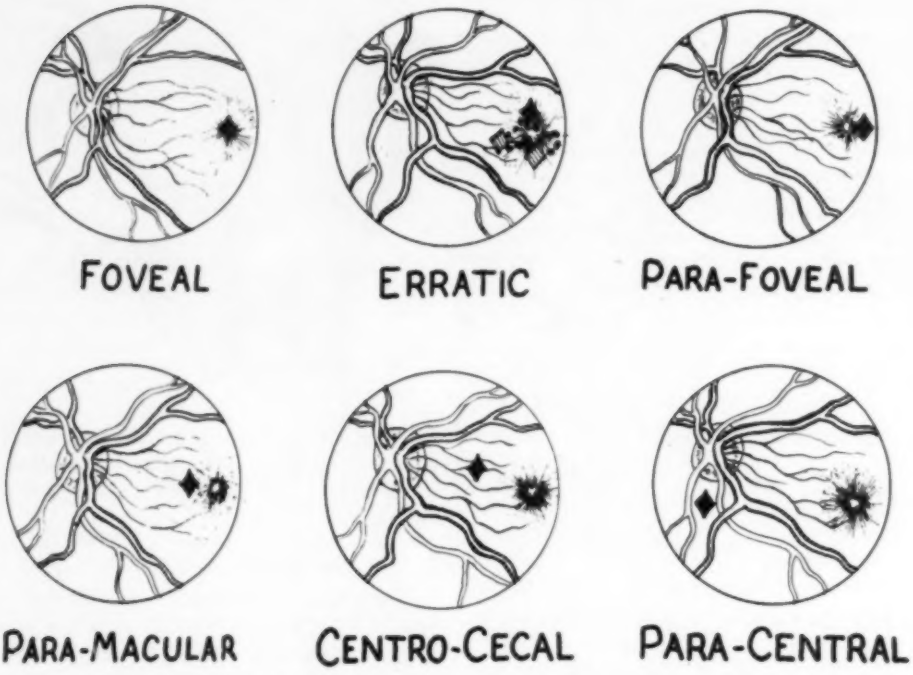

Fig. 9 (Priestley, Byron and Weseley). The various types of eccentric fixation.

4. Type of eccentric fixation

As shown in Figure 9, eccentric fixation may be erratic, parafoveal, paramacular, centro-cecal or paracentral. We have arbitrarily formulated this classification because we feel that it provides an excellent index to the possible efficacy of pleoptics in converting the eccentric fixation to the centric type. Patients in whom the erratic form exists prove to respond most quickly. That the closer the point of eccentric fixation lies to the fovea, the more successful is the treatment has become apparent in our short experience thus far. Cases of paracentral eccentric fixation are considered to have extremely poor prospects.

5. Presence of fusional vergences

Pleoptics is just one phase in the over-all management of patients with amblyopia, eccentric fixation and strabismus. This approach may convert the eccentric to centric fixation, and concurrently, enhance the development of normal visual acuity in this amblyopic eye; it will not alter the status of the strabismus. Therefore, unless the underlying condition causing the eccentricity and amblyopia is rectified, the success of pleoptic treatments is characterized by its brevity. Hence, the necessity for surgical correction of the strabismus arises. However, as is the case in patients exhibiting strabismus without eccentric fixation and/or amblyopia, unless adequate fusional vergences develop postoperatively, the chance of long-term binocular single vision diminishes profoundly. Without these essential fusional vergences, the newly straightened eyes pursue the inexorable course back to heterotropia. When the chances for their development are poor, the patient should not be considered as a likely candidate for pleoptic training.

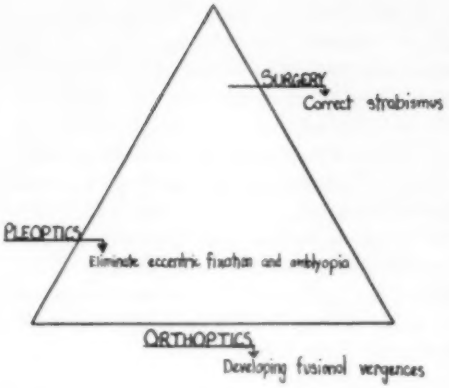

Fig. 10 (Priestley, Byron and Weseley). Diagramatic presentation of the three basic therapeutic approaches for patients with strabismus, amblyopia and eccentric fixation.

An equilateral triangle may be used as a convenient representation of the three intimately related parts in the over-all management of eccentric fixation, amblyopia and strabismus (fig. 10). How these three parts share in effecting single binocular vision in our patients will be described in the next section.

Protocol followed at our pleoptic clinic

1. Screening of patients

All patients at the New York Eye and Ear Infirmary are examined initially in the out-patient clinic. If they exhibit any orthoptic problems, they are then referred to the orthoptic department for a cycloplegic refraction and complete workup. All cases of amblyopia are then referred to the pleoptic department before any patching is prescribed to determine the possible existence of eccentric fixation by the following procedure:

The amblyopic eye is fully dilated. After evaluation of the fixation in the good eye by visuskopy, the amblyopic eye is examined as described above for eccentric fixation. This sequence is followed because it best shows the patient what he should see when the poorer eye is being evaluated.

Those patients in whom eccentric fixation is found to exist are then euthyskoped to evaluate the ease with which after-images may be produced. As mentioned above, the appreciation of after-images is greatly facilitated by employing a flickering overhead light.

If the patient perceives a negative after-image, both cortical and angular-type visual acuities are then recorded to ascertain whether agnosia exists.* When either a positive after-image or no after-image is perceived, the determination of visual acuity is not necessary because it would be the same as that value obtained in the orthoptic workup.

During this evaluation period, which requires from five to 15 minutes, the examiner achieves some insight into the intelligence and motivation of the prospective patient. By correlating all the criteria already listed, namely the age, intelligence and motivation of the patient, type of eccentric fixation and presence of fusional vergences, the examiner then places the candidate into one of three groups for future pleoptic training.

Group 1: Excellent prognosis for sustained binocular vision

This group contains those patients between five to 15 years of age who are highly intelligent, possess above-average intelligence, exhibit the erratic, parafoveal or paramacular type of eccentric fixation, and possess any fusional amplitudes. Three pleoptic treatments per week to be described in the next section are scheduled for these pa-

* Agnosia is the inability to recognize figures which are seen. It is manifest in one of two ways. Firstly, the patient may be able to read individual Snellen letters or numbers, called angular visual acuity, but not whole lines of these figures, called cortical visual acuity. Secondly, the patient may state that he actually sees the Snellen figures, but cannot recognize them. Agnosia has been attributed to inhibition at the synapses between the association and visual areas of the brain.

tients until centric fixation and 20/30 visual acuity in the amblyopic eye result. No orthoptic training is scheduled until this status is achieved.

Group 2: Fair prognosis for eventual binocular single vision

Falling within the limits of this category are those patients also between five to 15 years, but who show any of the following discouraging factors:

1. Inability to comprehend instructions
2. Unusually short span of attention
3. Negativistic attitudes toward the treatments
4. Centro-cecal or paracentral types of eccentric fixation
5. No fusional vergences

For an arbitrary period of four to five weeks, these patients are also scheduled for three treatments per week. If the first five factors are remedied, then orthoptic training is integrated with pleoptics in an attempt to ascertain whether fusional vergences may develop. When most of these deterring factors persist after a reasonable trial period, the candidate is then reclassified into Group 3 and treated accordingly.

Group 3: No prognosis for binocular single vision

All patients older than 15 years and those reclassified from Group 2 comprise this unit. The sole purpose of training for these patients is to stimulate maximal visual acuity in the amblyopic eye for future use in case the individual loses the vision in his good eye.

To clarify this concept, an analogy between the recall phenomenon of antibodies used in immunology and this stimulation of visual acuity for possible later utilization is postulated. By enhancing the vision in such an amblyopic eye by pleoptics, a later attempt to regain this same degree of visual acuity following loss of vision in the good eye will be greatly expedited.

Pleoptics in this group, therefore, serves as a "visual booster shot." We hope eventually to attempt in our clinic to ascertain the feasibility and effectiveness of periodically prescribing these "visual booster shots" for these patients.

Patients who qualify as candidates in any of these three groups are instructed to patch the amblyopic eye for three weeks after this screening session. This measure usually ameliorates the stability and intensity of the eccentric fixation and expedites the conversion to centric fixation. The actual treatments are then commenced.

2. Description of treatment sessions

Each treatment is essentially the same in the early phases, differing only in the duration of exposure to the euthyskop and use of the co-ordinator. The pupil of the amblyopic eye is dilated prior to each treatment with 0.5-percent Isopto-Atropine for children younger than 15 years, or 10-percent Neosynephrine for older patients after checking the intraocular pressure. After effecting mydriasis, the status of the fixation in the amblyopic eye is checked by visuskopy with the red-free light so as not to dazzle the fovea. Both angular and cortical visual acuity of the amblyopic eye with the patient wearing his refractive correction are then recorded. Euthyskopy follows the evaluation of visual acuity. Both techniques, visuskopy and euthyskopy, are performed exactly the same way as were described previously.

How long we do euthyskopy depends upon the patient's response. Some perceive the negative after-image more easily following 10 seconds of exposure while others require 20 to 30 seconds of stimulation. Occasionally, a positive after-image precedes the appearance of a negative one despite any variation in the time of exposure. If no after-image appears, the patient is restimulated. A total of three flashes with the euthyskop are given during any one session in an attempt to effect an after-image. If the desired result is still not obtained, the patient's amblyopic eye is re-

patched, and an appointment is scheduled for two days later.

The co-ordinator is utilized after the patient has perceived the negative after-image as discussed above. The duration of exposure to this instrument varies with each patient. In our short experience thus far, we have observed that some patients benefit greatly by using this instrument for as long as 20 to 30 minutes. Others with shorter spans of attention lose interest after five minutes. When possible, this phase of treatment should be enacted in group situations so that an environment of amiable competition is created.

Following exposure to the co-ordinator, visuskopy is repeated to evaluate the status of fixation. Finally, both types of visual acuity are again recorded to ascertain whether any progress has been achieved during the treatment session which averages about 25 minutes.

When the erratic or parafoveal eccentric types of fixation are noticed either initially, or after some treatments have been performed, euthyskopy is done with the smallest possible central black arc. This protects just the fovea, and stimulates the site of eccentric fixation more effectively than with the standard five-degree central black arc. This technique accelerates improvement during the later stages of treatment.

The amblyopic eye remains patched between treatments until the visual acuity improves to 20/30. As can be appreciated from Figure 11, visual acuity of this magnitude must stem from the fovea. One degree of eccentric fixation results in visual acuity no better than 35 percent of normal. Once we achieve the level of visual acuity compatible with foveal fixation, the management of patients in the three groups follows different paths.

Group 1. By moving the patch to the good eye, foveal fixation is constantly stimulated. Pleoptic treatments continue three times per week in conjunction with orthoptic techniques which are now instituted to enhance fusional vergences. When the patient develops normal amplitudes and exhibits no tendency to revert to eccentric fixation, surgery is indicated to correct any existing strabismus. Postoperatively, both pleoptic and orthoptic treatments are employed concurrently without patching of either eye. The results in this group are excellent.

Group 2. Patching of the fixing eye is also employed between pleoptic treatments for patients in this group while orthoptic measures are now employed in an attempt to instill fusional vergences. If this capacity is learned, the future management and prognosis for binocular single vision in these patients simulate those of Group 1. When fusional vergences do not develop in these patients after intense orthoptic training has been attempted, the management and prognosis correspond to those of patients in Group 3.

Group 3. Since the prognosis for the ultimate development of single binocular vision in this group is extremely poor, if at all possible, the management employed, once foveal visual acuity is achieved in the amblyopic eye, depends upon the age of the patient.

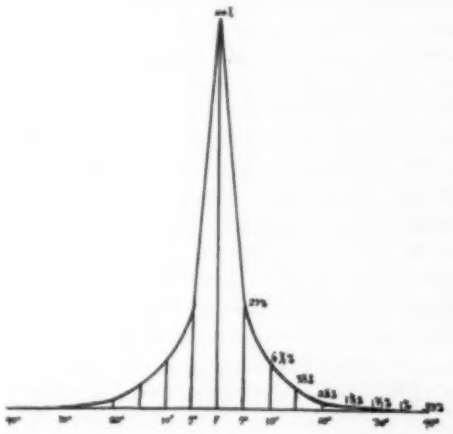

Fig. 11 (Priestley, Byron and Weseley). The loss of visual acuity, expressed in percent along the ordinate, as a function of the distance away from the fovea (F) expressed in degrees along the abscissa.

In younger patients, cosmetic surgery is performed to correct any existing heterotropia. Postoperatively, orthoptic measures are given another brief trial to effect fusional vergences. This is usually unsuccessful, but we feel it is certainly justified before irrevocable uniocular vision results. No patching is employed in view of the suppression which shortly develops in the treated eye.

In older patients, cosmetic surgery is performed at the discretion of the individual in the presence of heterotropia. Postoperative orthoptics are not utilized.

The above-described protocol may appear to be rigid and dogmatic. However, as is the case with any new sphere of therapeutics, certain standards and classifications must be formulated for descriptive purposes. Actually, considerable flexibility exists in the management of our patients. Each one is evaluated independently and treated accordingly. Only after many cases have been studied for a reasonably long period of time and elaborated statistically will a more accurate classification be possible.

Results by treatments

That pleoptics result in a high percentage of success when treating amblyopia with eccentric fixation can be appreciated by surveying the contemporary European ophthalmologic literature.

Verbally summarizing a complex diagram from an article by Bangerter in 1955 in which he shows the results of his method, we find that he divided his cases into three groups depending upon the age of the patients. In the group from three to six years which included 28 cases, he achieved good results in 15 patients; 69 patients ranged between seven and 14 years of age of which 43 were treated successfully. Surprisingly, five out of eight cases between 15 to 25 years manifested significant improvement. Successful treatment in these cases was based on the degree of improvement in visual acuity of the amblyopic eye. Unfortunately, no mention of the duration of the effected visual acuity or of development of binocular single vision was found in this article. It should be noted that in his series, all patients were treated regardless of the presence of any unfavorable factors. Hence, his results show no better than 54 percent success in the first age group, 62 percent in the second, and a rather remarkable 63 percent in the older group.

Cüppers and Sevrin, using the former's method, have accumulated the largest series of published reports in 1956 and 1957. In 200 cases, they reported 80 percent success, 18 percent improvement and only two percent failure in treating amblyopia with eccentric fixation.

Other workers in Europe report the following results: Krajevitch in 19 cases cited 80 percent success, 10 percent improvement and 10 percent failure. Thomas achieved only 26 percent success, 24 percent improvement and 50 percent failure in treating 76 cases. The latest article by Mayweg and Massie in 1958, describing the results from the High Holborn Branch of Moorfields Eye Hospital in London, shows that they achieved successful results for restoration of good distant vision in 47 percent of 38 cases; 76 percent of these same 38 cases showed improvement in near visual acuity. These authors readily admit that adequate follow-ups to evaluate the long-term maintenance of the effected vision have not yet been accumulated. As was lacking in Bangerter's article, none of these authors state whether binocular single vision ever developed and persisted.

Our results at the New York Eye and Ear Infirmary during the brief period in which we have been treating patients with amblyopia and eccentric fixation are most encouraging and promising. We plan to publish a later article in which we will describe more fully the course of each case, the length of time during which visual acuity remained improved in the treated eye, whether binocular single vision developed, and the type of treatment which was employed in each

case prior to the institution of our pleoptic methods. It is germane to this article to report cursorily the progress which has ensued thus far in eight typical cases.

Case reports

Case 1

A. A., an intelligent, well-motivated, 12-year-old girl when first seen was fixing one-degree temporal to the fovea in her left eye, possessed visual acuity of 20/100+1, and exhibited questionable fusional capacity. After 10 visits, the patient attained centric fixation and an optimal vision of 20/30+.

Case 2

C. B., an intelligent, moderately well-motivated, 10-year-old boy when first seen was fixing erratically on his fovea in his right eye, had a visual acuity of 20/50, and showed poor fusional capacity. After six visits, the patient had fairly stable centric fixation and a visual acuity of 20/40+.

Case 3

P. B., an intelligent, well-motivated, 16-year-old boy when first seen was fixing two degrees superotemporal to the fovea in his right eye, had a visual acuity of 20/200 and showed fairly good fusional potential. After 13 visits, the patient attained an erratic type of centric fixation (still mostly off center about one-half degree superotemporally) and a visual acuity of 20/40—1. This patient has exhibited the phenomenon of agnosia which partly explains his slow rise in visual acuity.

Case 4

R. B., a 12-year-old well-motivated boy of average intelligence, when first seen was fixing seven degrees nasal to the fovea in his left eye. After three visits, he can appreciate negative after-images for short periods. Fixation is thus far unchanged in position, and the prognosis is poor.

Case 5

C. C., an intelligent, well-motivated, eight-year-old girl, when first seen was fixing one degree temporal to the fovea in her left eye, had a visual acuity of 20/70+1, and fair fusional possibilities. After 12 visits, the patient is fixing centrically with an optimal, though variable, visual acuity of 20/30+. This patient has demonstrated how performance can vary with motivation, thereby partly explaining her inconsistent acuity.

Case 6

L. A., an intelligent, well-motivated, 14-year-old boy, when first seen was fixing one degree nasal to the fovea in his right eye, had a visual acuity of 20/50+ and good fusional possibilities. After four visits, patient is fixing just nasal to the fovea (sometimes centrically) and has attained a visual acuity of 20/20—1.

Case 7

F. R., an intelligent, rather poorly motivated, 11-year-old girl, when first seen was fixing two degrees temporal and slightly superior to the fovea in her left eye, had a visual acuity of 20/100, and exhibited poor fusional possibilities. After 12 visits, the patient is fixing centrically and has attained a vision of 20/50+. Her poor co-operation slowed her progress at first but she has improved with understanding and patient handling.

Case 8

B. S., a 12-year-old boy of less than average intelligence but with good motivation, when first seen was fixing two degrees temporal to the fovea in his left eye, had a visual acuity of 20/200 and fair fusional possibilities. After nine visits, the patient shows an erratic type of centric fixation and has attained an optimal visual acuity of 20/80—2. This case clearly shows that pleoptics is a technique which requires better than average intelligence for best results.

Summary

Bangerter inaugurated the treatment of amblyopia with new methods and called it pleoptics. It was the merit of Cüppers to simplify and modify pleoptics, and put it within the reach of every ophthalmologist. The instruments devised by Cüppers (visuskop, euthyskop, flickering light and coordinator) are described, and the techniques of using them are explained. The theory of the therapeutic value of the after-image is discussed.

The criteria for the selection of patients with amblyopia and eccentric fixation are enumerated: age of patient, intelligence and motivation of patient, type of eccentric fixation and presence of fusional vergences. Screening of patients for pleoptic training enables us to divide them into one of three groups based on the prognosis for development and maintenance of single binocular vision. We follow Cüppers' method which revolves about the use of his four instruments.

Every patient should be examined with the visuskop to ascertain whether eccentric fixation is present. This instrument will allow the observer to discover minor degrees of eccentricity which would be missed by other techniques. Patching of the fixing

eye which would only further stabilize the eccentricity is thereby avoided.

That pleoptic methods are effective is demonstrated by citing some of the results compiled from European clinics. Eight typical cases from our service are discussed briefly. We hope to publish another report in the near future containing more cases, longer follow-ups, and statistical analysis of our results.

317 East 13th Street (3).

We wish to thank Miss Jane Romanio, chief orthoptic technican, and Miss Linda Wright, pleoptic technician, for their untiring assistance and co-operation. The figures for this article were drawn by Alan C. Weseley, M.D.

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NONSPECIFIC TESTS IN UVEITIS*

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There is a growing number of clinical and laboratory reports in the literature exploring the relationship between uveitis and systemic disease. Since it is generally accepted that the systemic involvement causing uveitis is often asymptomatic, it is natural for the students of uveitis to look for a test refined enough to detect a latent infection or sensitivity.

One approach to this problem is to study the same patient with a battery of overlapping tests, trying to detect the same serologic imbalance from different angles. A good example would be: Sedimentation rate and serum proteins ratio. Actually, an elevated sedimentation rate reflects a shift in the serum-protein ratio.

Another approach is to find a test equally suitable for aqueous and blood serum which could either tie the systemic and ocular condition into one package or prove the existence of two separate entities. The C-reactive protein determination is an example of this method of testing.

These methods are included in our surveys for uveitis and the results constitute the subject matter of this report.

A. Sedimentation rate and hemocytology

Sedimentation rate reading was done in 112 patients. A recent paper by Bedrossian[1] threw a new light on the value of this test.

* From the Department of Research, Wills Eye Hospital. This work was supported in part by a research grant from the National Institutes of Health, U. S. Public Health Service, and the Hartford Foundation.

TABLE 1

COMPARATIVE RESULTS OF SEDIMENTATION RATES IN UVEITIS

	Normal Sedimentation Rates		Elevated Rates		Total Cases	
	Wills Hosp. Series	Bedrossian's Series	Wills Hosp. Series	Bedrossian's Series	Wills Hosp. Series	Bedrossian's Series
Nongranulomatous uveitis	25 (60%)	6 (25%)	17 (40%)	18 (75%)	42	24
Granulomatous uveitis	53 (76%)	13 (86.7%)	17 (24%)	2 (13.3%)	70	15
Controls	—	93 (84.5%)	—	17 (15.5%)	—	110

He felt that the percentage of elevated sedimentation rates in nongranulomatous uveitis is significantly higher than in granulomatous uveitis. Table 1 compares our respective figures obtained using the same method and standards as his. While it is true that our percentages are less "clear-cut" it is also true that they point in the same direction: 40 percent of elevated sedimentation rates in the nongranulomatous group as compared with 24 percent in the granulomatous group implicates a more frequent systemic pathologic background in the "nongranulomatous" patient. This is further corroborated by breaking down the granulomatous group into its three component types as in Table 2 which shows uniformly lower percentages of elevated sedimentation rates in all the three groups of granulomatous uveitis.

Red and white blood counts were of very little help in correlating or diagnosing uveitis. In this we are in complete agreement with Smith and Ashton[2] in England. To compare our results we used the same values as theirs for normals: above 12,000 WBC were considered abnormal. All our differential counts were within normal limits. Three cases classified as "nongranulomatous uveitis" and one coming under the heading of "Panuveitis" had WBC above 12,000. All, with one exception, had elevated sedimentation rates and an obvious, clinically diagnosed condition, justifying this blood picture: one active chronic pulmonary tuberculosis, one case of bronchopneumonia, one case of pneumonitis and suppurative otitis media and one case of a recent severe allergic reaction to penicillin and Diamox.

B. SERUM PROTEINS

The significance of serum protein levels and particularly of the albumin-globulin ratio is well established in such conditions as sarcoidosis, rheumatoid arthritis, or where there is a known high antibody titer. But in the majority of cases of uveitis where etiology is either unknown or, at best, based on circumstantial evidence like chronic sinusitis or positive Mantoux test, the significance of serum protein levels is not so clear. Zwiauer and coworkers[3] claim that in anterior uveitis there is a shift in the A/G ratio as a result of increased capillary permeability and passage of the smaller albumin molecules into the tissues. In order to eliminate as much as possible the discrepancies in blood serum de-

TABLE 2

SEDIMENTATION RATE IN DIFFERENT TYPES OF UVEITIS

		Normal Sedimentation Rates	Elevated Rates	Total Cases
Anterior nongranulomatous uveitis		25 (60%)	17 (40%)	42
Granulomatous uveitis	Anterior	14 (78%)	4 (22%)	18
	Posterior	22 (79%)	6 (21%)	28
	Panuveitis	17 (71%)	7 (29%)	24

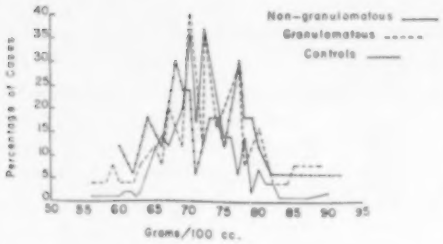

Fig. 1 (Wolkowicz, et al.). Comparative distribution profile of total serum proteins in normal individuals, granulomatous and nongranulomatous uveitis patients.

terminations we began by analyzing blood samples of 300 Red Cross donors. Those values were compared with our uveitis series.

All chemical analyses were made by the same technician applying the Kjeldhal and biuret technique. The globulin fractions were determined by the electrophoretic method. Chemical determinations of the control group were compared with 132 uveitis cases of which 80 were classified as granulomatous and 52 as nongranulomatous.

Figures 1, 2, and 3 are comparative distribution graphs of total proteins, albumins and globulins in the three respective groups. In order to make uveitis curves comparable with the control curve the data of granulomatous and nongranulomatous groups were multiplied by their respective coefficients. (This method of "blowing up" numerical data in order to compare graphically three different series is scientifically inaccurate, more so when small series are involved but it helps to visualize quickly outstanding trends and shifts.)

A glance at the graphs shows that there is no appreciable difference in distribution density between the two uveitis groups and the control group. This is true of total proteins as well as of their two main components. Referring to the graphs, maximum distribution range for total proteins is somewhere between 6.2 and 8.2 gm. percent, for globulins 2.0 to 3.5 gm. percent and for albumins 3.8 to 5.2 gm. percent.

Since Woods, et al.[4] published recently a detailed analysis of chemical and electrophoretic data of serum proteins in 55 uveitis patients, we felt it might be of interest to compare our respective figures. For this purpose we accepted the same normal range for albumin 4.0 to 6.0 gm. percent and for globulin 1.8 to 2.9 gm. percent. While we are aware that the chemical results might vary somewhat from one laboratory to another, the relative values between the granulomatous and nongranulomatous group would retain its significance.

Table 3 shows that the values for total proteins in the granulomatous and nongranulomatous group are the same, the control group having a slightly larger "normal" percentage. The deviations from normal show the same trend in all three groups towards

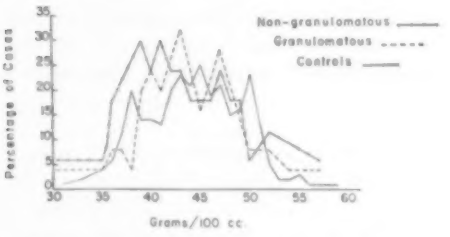

Fig. 2 (Wolkowicz, et al.). Comparative distribution profile of serum albumins in normal individuals, granulomatous and nongranulomatous uveitis patients.

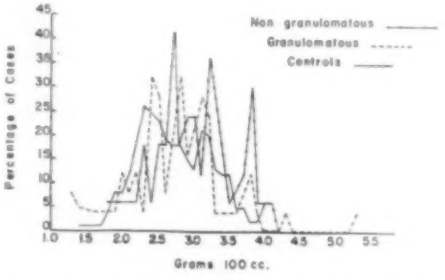

Fig. 3 (Wolkowicz, et al.). Comparative distribution profile of serum globulins in normal individuals, granulomatous and nongranulomatous uveitis patients.

TABLE 3

COMPARATIVE VALUES OF TOTAL SERUM PROTEINS AND SERUM PROTEIN FRACTIONS IN THE GRANULOMATOUS, NONGRANULOMATOUS AND CONTROL GROUPS

Type of Group	Total Proteins	Serum Albumin	Serum Globulin
Granulomatous = 80 patients	Normal = 65 (81%) High = 12 (15%) Low = 3 (4%) Average = 7.4 gm.%	Normal = 63 (79%) High = 0 (0%) Low = 17 (21%) Average = 4.4 gm.%	Normal = 44 (55%) High = 33 (41%) Low = 3 (4%) Average = 2.9 gm.%
Nongranulomatous = 52 patients	Normal = 42 (81%) High = 8 (15%) Low = 2 (4%) Average = 7.2 gm.%	Normal = 39 (75%) High = 0 Low = 13 (25%) Average = 4.2 gm.%	Normal = 28 (54%) High = 24 (46%) Low = 0 Average = 2.9 gm.%
Controls = 300 patients	Normal = 276 (92%) High = 22 (7%) Low = 2 (1%) Average = 7.2 gm.%	Normal = 238 (79%) High = 0 (0%) Low = 62 (21%) Average = 4.4 gm.%	Normal = 187 (62%) High = 111 (47%) Low = 2 (1%) Average = 2.8 gm.%

the higher fractions. Serum albumins also show great similarity among the three groups. Here the deviations are shifted towards the "low" values. The relative globulin levels differ very little from one group to another. The "normals" comprise 54 to 62 percent of the total number of cases. The deviational trend is towards higher levels and is pretty much the same in the uveitis as in the control group. Obviously these data would be of very little help in differentiating a uveitis patient from a normal individual or in classifying a uveitis case.

C. Globulin fractions: Electrophoretic studies

To compare further our respective series 92 blood sera of 58 granulomatous and 34 nongranulomatous patients had the chemical analysis complemented with electrophoretic estimations. Here again our conclusions are only valid by comparing our granulomatous with nongranulomatous group. Comparisons between Woods, et al. series and ours are only conjectural since our respective normal standards are different. Woods[5] and his coworkers compared visually electrophoretic patterns of patients with pooled normal serum, and expressed the results as percent of the normal pattern. We accepted, as normal range, the standards mostly given by E. Miller[6] namely: Alpha-1, 0.2-0.4 percent; alpha-2, 0.5-0.9 percent; beta 0.7-1.3 percent; and gamma 0.6-1.2 percent.

Table 5 shows convincingly that chemical analysis alone does not always reflect a deviational trend to be found in the electrophoretic pattern. In 50 percent of patients in the granulomatous group and 65 percent in the nongranulomatous group could a reasonable correlation be found between the chemical and electrophoretic estimations. Stated differently, in slightly more than half the patients in either group could we foretell the deviational trend of the globulin fractions by the chemical values of the total globulin.

TABLE 4

CORRELATION BETWEEN CHEMICAL AND ELECTROPHORETIC ESTIMATIONS IN GRANULOMATOUS AND NONGRANULOMATOUS UVEITIS

Type of Uveitis	Normal Chemical and Electrophoretic Patterns	Correlation between Chemical and Electrophoretic Determinations	No Correlation between Chemical and Electrophoretic Determinations
Granulomatous	12%	56%	44%
Nongranulomatous	14%	65%	35%

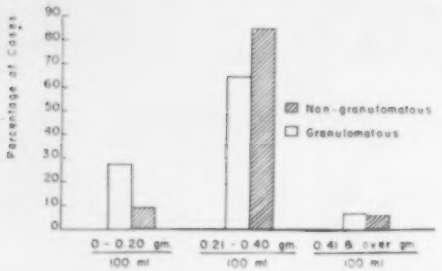

Fig. 4 (Wolkowicz, et al.). Comparative distribution profile of alpha-1 globulin in granulomatous and nongranulomatous uveitis patients.

The close similiarity between the two groups should be noted. No less startling is the fact that only 12 percent of granulomatous patients and 14 percent of nongranulomatous patients had chemical globulin determinations and their respective electrophoretic patterns within accepted normal range. Unfortunately we do not have a suitable control series of electrophoretic patterns with which to compare but, if we accept the similarity of chemical serum protein analyses between the uveitis and control series as a yardstick for further speculation, we can surmise that even in a "normal" individual a combination of a normal ratio of serum proteins and normal electrophoretic pattern is a rare thing indeed.

From the breakdown of globulin fractions in granulomatous and nongranulomatous series one can draw only a few general conclu-

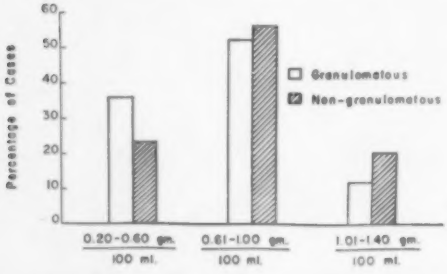

Fig. 5 (Wolkowicz, et al.). Comparative distribution profile of alpha-2 globulin in granulomatous and nongranulomatous uveitis patients.

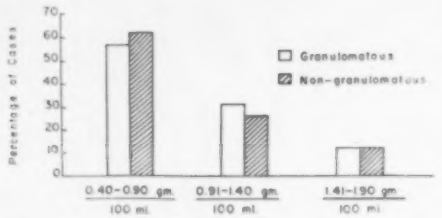

Fig. 6 (Wolkowicz, et al.). Comparative distribution profile of beta globulin in granulomatous and nongranulomatous uveitis patients.

sions. Figures 4, 5, 6, 7 show the comparative distribution profile of alpha-1, alpha-2, beta and gamma globulin fractions in the uveitis series.

It is clear from those graphs that the difference between the granulomatous and nongranulomatous columns is too small to have any statistical significance. The normal range comprises slightly more than 50 percent of all cases and the deviations do not fall into any meaningful pattern. Alpha-1 can perhaps be considered an exception to this rule. The distribution (especially in the nongranulomatous group) is less scattered and the maximum concentration lies within the accepted limits of normal range. Table 4 breaks down the data into "normal," "high" and "low" in order to have a visual comparison with a somewhat similar table introduced by Woods and Stone.[4]

We also find that in the granulomatous group the "low" deviation exceeds the "high" deviation (22 percent as compared with 15 percent) and that this ratio is re-

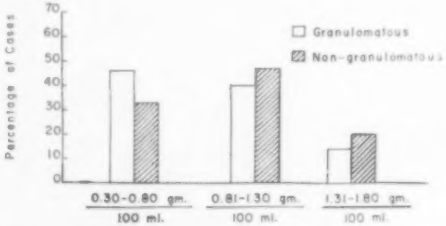

Fig. 7 (Wolkowicz, et al.). Comparative distribution profile of gamma globulin in granulomatous and nongranulomatous uveitis patients.

TABLE 5

COMPARATIVE ELECTROPHORETIC ESTIMATIONS OF GLOBULIN FRACTIONS IN GRANULOMATOUS AND NONGRANULOMATOUS SERIES

Type of Uveitis	Alpha-1	Alpha-2	Beta	Gamma
Granulomatous	Normal = 42 (63%) High = 4 (9½%) Low = 12 (27½%) Average = 0.26 gm.%	Normal = 39 (55%) High = 8 (13%) Low = 11 (11%) Average = 0.66 gm.%	Normal = 30 (52%) High = 11 (20%) Low = 17 (28%) Average = 0.93 gm.%	Normal = 33 (63%) High = 9 (15%) Low = 12 (22%) Average = 0.90 gm.%
Nongranulomatous	Normal = 29 (85%) High = 2 (6%) Low = 3 (9%) Average = 0.29 gm.%	Normal = 19 (57%) High = 8 (23%) Low = 7 (20%) Average = 0.76 gm.%	Normal = 22 (64%) High = 7 (20%) Low = 5 (16%) Average = 0.97 gm.%	Normal = 23 (67%) High = 8 (23%) Low = 3 (10%) Average = 0.99 gm.%

versed in the nongranulomatous group. Woods, et al. consider this an indication of general immunity or a failure of the antibody to respond to the antigenic insult. All attempts to correlate in our series the globulin fraction deviations with foci of infection, bacterial or protozoan sensitivity, or the acuteness of the inflammatory process proved to be fruitless.

D. C-REACTIVE PROTEIN IN BLOOD SERUM

The C-reactive protein determination is believed to be of the same significance as sedimentation rate. Actually the test has certain technical advantages over the latter:

1. It requires a minute amount of serum —a single drop.
2. It can be performed on the aqueous.
3. It does not exist in normal blood serum or aqueous, therefore, one does not need to establish an arbitrary normal range.

On the other hand the C-reative protein test is thought to be less specific than sedimentation rate as it might appear in allergic states where sedimentation rate is usually low. The significance and diagnostic value of the C-reactive protein test in blood serum was previously discussed by us.[7,8] Table 6 compares the relative percentages of positive C-reactive protein tests in our present uveitis series with our series published previously[7] and a central group of 482 individuals selected at random. There is a consistently higher percentage of positive C-reactive protein tests in both uveitis series, although the difference is not outstanding enough to serve as diagnostic criteria. When our present series of uveitis patients is broken down into the same components under which we tabulated our sedimentation rate results, a certain definite pattern emerges.

Table 7 shows that the highest rate of positive C-reactive protein tests is found in the "anterior uveitis" group regardless if it is granulomatous or nongranulomatous. The "posterior uveitis" group shows the lowest percentage and the "panuveitis" group, which comprises anterior and posterior segment involvement, yields the intermediate values.

Since a similar trend could be discerned in the sedimentation rate tests, we compared the results of C-reactive protein and sedimentation rates in Table 8. The correlation

TABLE 6

DISTRIBUTION OF POSITIVE C-REACTIVE PROTEIN TESTS IN A GROUP OF "NORMALS" AND SERIES OF UVEITIS PATIENTS

Groupings	No. of Cases	CRP+ No.	CRP+ %	CRP− No.	CRP− %
Normals	482	97	20	385	80
Uveitis series 1953	47	15	32	32	68
Uveitis series 1957–1958	137	39	28	98	72

TABLE 7

COMPARATIVE PERCENTAGE OF POSITIVE C-REACTIVE PROTEIN TESTS IN DIFFERENT TYPES OF UVEITIS

Groupings		No. of Cases	CRP+ No.	%	CRP− No.	%
Anterior nongranulomatous uveitis		55	19	34.5	36	65.5
Granulomatous uveitis	Anterior	22	7	32	15	68
	Posterior	30	4	13	26	87
	Panuveitis	29	8	27.5	21	72.5

between the two tests was somewhat higher in the nongranulomatous group: 77 percent as compared with 69 percent. The incongruous cases in the nongranulomatous as well as granulomatous group, where either C-reactive protein test was positive and sedimentation rate low or vice versa showed no discernible pattern from which one could draw any conclusions.

E. C-REACTIVE PROTEIN IN THE AQUEOUS

Testing for C-reactive protein determinations in aqueous was done on 39 eyes. The cameral puncture technique, followed in our series, was similar, with some modifications, to the one described by Verrey[9] and Amsler, et al.[10] Cameral puncture was never done on out-patients. Preoperative sedation was very much the same as for cataract surgery. Conjunctival smears and cultures were taken 24 hours prior to the puncture. During those 24 hours antibiotics were administered locally and systemically and were continued systemically for 48 hours following the puncture. The procedure was done under the same aseptic conditions as for intraocular surgery.

All punctures were done under O'Brien akinesia and a retrobulbar block with four-percent Novocaine to obtain a soft eye as the surest safeguard against such undesirable complications and accidents as hyphema or nicking of the lens capsule. While the assistant fixed the globe by grasping the medial rectus through the conjunctiva, with a fixation forceps, the operator entered the anterior chamber with an Amsler needle mounted on a tuberculin syringe, by puncturing the limbus at the temporal side. The operator at all times controlled the plunger of the syringe to prevent too rapid evacuation of the anterior chamber. Upon withdrawing the needle, atropine and a suitable antibiotic ointment were instilled and the eye was patched for 24 hours.

Table 9 shows the relative percentages of positive C-reactive protein tests in the aqueous of nongranulomatous patients and of the three types in the granulomatous group. This series is too small for any far reaching conclusions, but here, too, one can discern a higher percentage of positive C-reactive protein tests in eyes where the anterior ocular segment is involved. It is also obvious that the C-reactive protein test is not selective and therefore of no help in establishing an etiologic diagnosis. When one compares graphically the C-reactive protein

TABLE 8

COMPARATIVE RESULTS OF SEDIMENTATION RATE AND C-REACTIVE PROTEIN TESTS

	Sedimentation Rate CRP Correlation	Sedimentation Rate CRP No Correlation	Total
Nongranulomatous uveitis	37 (77%)	11 (23%)	48
Granulomatous uveitis	50 (69%)	23 (31%)	73

TABLE 9

COMPARATIVE PERCENTAGE OF POSITIVE C-REACTIVE PROTEIN TESTS IN THE AQUEOUS IN DIFFERENT TYPES OF UVEITIS

Groups of Uveitis		No. of Cases	CRP+		CRP−	
			No.	%	No.	%
Ant. nongranulomatous uveitis		19	6	31.5	13	68.5
Granulomatous uveitis	Anterior	6	1	17	5	83
	Posterior	2	0	0	2	100
	Panuveitis	12	3	33	9	64

blood serum and aqueous titers in the same individual (figs. 8 and 9) one can see that, with one exception, the aqueous titer is lower than its serum counterpart. The significance of C-reactive protein in the aqueous is not yet clear nor is its origin in the human eye known to us. Experimental studies on rabbits[11] seem to indicate that Cx-reactive protein can be formed intraocularly if the antigen is introduced in the eye alone. In this case the aqueous titer exceeds the blood serum titer. If the Cx-reactive protein originates systemically and reaches the aqueous by crossing the blood-aqueous barrier, as it occurs in a secondary aqueous, then we find the Cx-reactive protein titer in the aqueous consistently lower than the blood serum titer. While we are fully aware how erroneous it might be to compare experimental conditions in an animal with human ocular pathology, one can hypothesize that in our series the C-reactive protein finds its way into the aqueous through a passive transfer across pathologically altered blood-aqueous barrier rather than as a result of active intraocular formation.

COMMENT AND CONCLUSIONS

In this study of etiology and classification of uveitis several nonspecific overlapping tests were evaluated and compared. Where previous work was done along the same line our results were compared and whenever possible identical standards applied.

Sedimentation rate data were, to some extent, in agreement with previously published results, indicating a greater percentage of high sedimentation rates in nongranulomatous uveitis. Red and white blood cell counts showed no relationship whatsoever to uveitis. The few patients with elevated WBC suffered, while in the hospital, from an obvious systemic illness which fully accounted for the high counts.

Total serum proteins and serum protein fractions (albumin and globulin) were determined in 132 cases of uveitis of which 80 were granulomatous and 52 nongranulomatous.

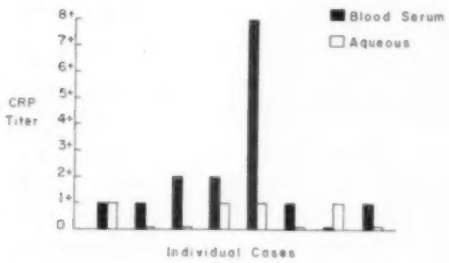

Fig. 8 (Wolkowicz, et al.). Comparative values of C-reactive protein titers in blood serum and aqueous of granulomatous uveitis patients.

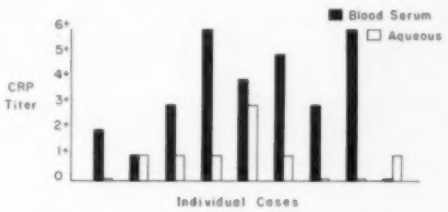

Fig. 9 (Wolkowicz, et al.). Comparative values of C-reactive protein titers in blood serum and aqueous of nongranulomatous uveitis patients.

These data were compared with determinations made on 300 normal blood sera. The comparative curves of all three groups differed very little. When the same data were tabulated according to standards applied to previously published series, the three groups (granulomatous, nongranulomatous and controls) showed again a striking distributional similarity.

Electrophoretic estimations of globulin fractions were made on 58 granulomatous and 43 nongranulomatous patients. The difference in the distribution profiles, of a given globulin fraction, between the two series was too insignificant to lend itself to any interpretations. In studying these graphs one gets the impression that we ought to be more flexible in interpreting our normal and abnormal electrophoretic patterns. The normal range of a given globulin fraction (perhaps with the exception of alpha-1) cannot be enclosed within rigid numerical values.

The C-reactive protein test in blood serum is more likely to be positive in a group of uveitis patients than in a group of normal individuals. The rate of positive tests is higher in uveitis involving the anterior ocular segment regardless of its etiology. The C-reactive protein test correlates with sedimentation rates: 77 percent in the granulomatous group and 69 percent in the nongranulomatous group.

The small series of 39 eyes with uveitis where C-reactive protein tests were made on the aqueous gave 25 percent positive results (10 eyes). Here also the eye with iritis or iridocyclitis will have a greater chance than a posterior choroiditis to show a positive C-reactive protein test. In no instance was there a positive test in the aqueous and a negative test in the blood serum, whereas the converse was not unusual. When the blood serum and the aqueous were positive, the aqueous titer, with one exception, was lower than its serum counterpart. These findings, plus data accumulated from experimental uveitis in animals, suggest a positive transfer from the circulating blood into the aqueous across a disturbed blood-aqueous barrier.

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A PHOTOGRAPHIC METHOD FOR THE DETERMINATION OF THE BEHAVIOR OF FIXATION*

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It has been pointed out by Cüppers,[1] Bangerter,[2] and others that the mode of pleoptic treatment varies considerably depending on whether the fixation is foveal, parafoveal, paramacular, eccentric or wavering. The exact determination of the retinal area which the patient uses for fixation is, therefore, a desirable and often mandatory procedure before any treatment is initiated, no matter whether one treats amblyopia with occlusion only or uses pleoptics.

The simplest method for the determination of the fixation pattern consists in the observation of the corneal light reflex while the fellow eye is under cover. This method may suffice to detect gross abnormalities. However, the small degrees of eccentricity which recently have gained clinical importance in the light of pleoptics will invariably escape recognition if one relies on this method alone.

The visuscope (Cüppers) has been designed to determine the exact location of the retinal fixation area. It fulfills this task, in general, very well but it has certain limitations, the main one being the very small size of the illuminated field. Therefore, orientation in the fundus often becomes difficult even for the experienced observer when eccentric fixation is present, and no points of reference appear in the illuminated retinal area.

A photographic method for the determination of the retinal fixation area has been reported by Steiger and Würth.[3] These authors used a pin with a large head inserted into the fundus camera at the point where the first aerial image of the retina was formed, there being a second image at the level of the photographic film. The image of the head of the pin appeared on the retina of the patient who was requested to fixate the pin while a picture was taken.

We have experimented with this method, but have found that the fixation target used by Steiger and Würth is too large and coarse an object, obscuring the foveola and making it therefore difficult to recognize small degrees of eccentricity such as parafoveal fixation. We developed a different fixation target which has been mentioned by us (Burian,[3] von Noorden[4]), but this too proved not to be entirely adequate. Accordingly, a new fixation target has been constructed which hides only a minimal area of the retina, occupies a large enough area and has the proper character to act as an adequate stimulus for fixation.

The new target (fig. 1-D) is a black dot about 0.25 mm. in diameter, centered within a 2.0 mm. circular line about 0.15 mm. thick. While the whole target can be said to be 2.0 mm. in diameter, the area between the dot and circle is unfilled and thus transparent. Therefore, when the image of the target is superimposed upon the image of the fundus, very little of the latter is hidden. If the target appears upon the image of the subject's fovea, the foveolar reflex can often be identified within the area enclosed by the circle. This allows a reasonably accurate judgment of whether the subject is fixating foveally or with a parafoveal area.

The following description and illustrations relate to the use of the target with the specific type of fundus camera at our disposal. It can only be assumed that an adaptation of this device can be made to any camera containing an element of indirect ophthalmoscopy, the aerial image.

The Zeiss Nordenson fundus camera with carbon arc was employed. It was not of the reflex free type, and therefore, overlapping white dots, rep-

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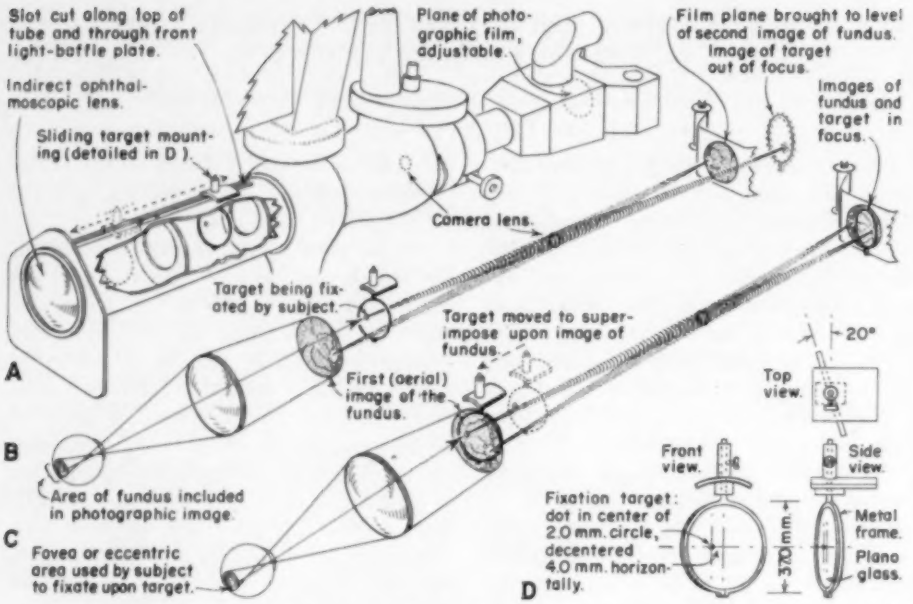

Fig. 1 (von Noorden, Allen and Burian). (A) Outline drawing of camera housing with part essential to photography indicated. (B) Diagram of optical system showing first stage of focussing the images. (C) Second stage showing images in proper focus for photographic exposure. (D) Detail of the target and supporting structure.

resenting reflections from the center of the ophthalmoscopic lens of the camera, are seen in the center of all photographs. Because of these reflections the target had to be decentered 4.0 mm.

Figure 1-A shows the outline of that portion of the Nordenson camera containing the elements of greatest interest to our present purposes: the indirect ophthalmoscopic lens at the end of the camera nearest the subject eye; the tube which supports it and the light-baffles within it; the camera lens; and the film plane.

The fixation target must be made to insert into the tube between the ophthalmoscopic and camera lenses, because it is here that the aerial image of the fundus is formed, except in highly myopic eyes, as indicated in the correlated diagrams A, B, and C of Figure 1.

The target is made upon a Leitz Cover Glass Plate, commonly used for small size lantern slides, 48 mm. square and approximately 0.8 millimeters thick. The glass is mounted in a lathe at an exact right angle to the turning axis and decentered 4.0 mm. Both the dot and ring are scribed to a moderate depth by a carbide steel marking point. Scribing too deeply will not only broaden the marks undesirably, but will also tend to chip the glass, resulting in a ragged line. After removal from the lathe, the dot and line are filled by rubbing with a black or dark blue glass marking pencil.

The glass is given to an optician to be edged properly to fit within a 35-mm. circular metal frame (fig. 1-D) which, in the example shown, is the rim of a standard hand held trial glass. If another type of frame is used the rim must be small enough to pass through the opening of the baffle plate within the camera. The handle is cut from the rim and a 1/16 inch drill rod or equivalent steel wire is soldered in its place. This then can be hung from a plate, such as shown in Figure 1-D, which will fit on the fundus camera by means of minor alterations to the latter. A small rectangular block should extend downward from the center of the plate to act as a guide, keeping the target tilted at an angle relative to a slot cut in one of the tubes of the fundus camera (fig. 1-A). A vertical hole in the plate and a set-screw are necessary for two adjustments of the target. One is the vertical adjustment so it may be centered or decentered properly within the camera tube so as to pass freely through the opening of the baffle-plate mentioned. The other is for rotating the glass on the vertical axis just enough, about 20 degrees, as noted in Figure 1-D, to avoid a glaring reflection of the light source back upon the photographic film.

A slot 5/16 of an inch wide and 5.5 inches long is cut through the top side of the tube of the fundus camera parallel to its axis (fig. 1-A). This slot

forms both the portal for insertion and removal of the target and the track along which the latter is moved to coincide with the image of the fundus.

Light-baffles, in the form of ringlike metal plates, are present at intervals between the ophthalmoscopic and camera lenses. One of these, located about the middle of the length of the tube referred to, must be cut through just adjacent to the slot in the tube, in order to permit the supporting device for the target to pass and traverse the length of the track. The piece cut from the baffle should be narrower than the slot, about 3/16 of an inch wide. Thus, a replacement piece 0.25 of an inch wide can be lowered throught the slot in the tube after the target is removed for the camera to be placed back into regular use. The replacement segment of the baffle-plate should be attached to a dust-cover which can be laid over the slot during regular use. The dust cover can be of such simple design that it should not be necessary to detail it here.

The ophthalmoscopic lens, together with the optical system of the subject eye forms an enlarged aerial image of the fundus. In the cases of eyes with only moderate spherical corrections this image is located *within the tube* which supports the ophthalmoscopic lens. In these subjects the image is real and inverted.

The camera lens, indicated in Figure 1-A, B and C focuses upon the aerial image as its object and projects its image toward the photographic film and the side-arm focussing lens just above it. The camera lens is fixed in position. Therefore, if the aerial image (the object in this relationship) is located near one end or the other of the tube, the image formed at the back of the fundus camera is in focus at one level or another accordingly and the film and side arm focussing lens must be moved to coincide.

Whenever the aerial image is located in the tube, it is possible to place an object such as the target at the same level and thus have an image of it projected simultaneously upon the photographic film. Furthermore, and of greât importance to our present purpose, a target placed at the exact level of the aerial image, and over a specific point of the image, will be projected directly upon the corresponding point in the subject's fundus. Therefore, even though the target is decentered as in our device, if the aerial image of the retina and the target are brought to exactly coincident focus, then, if the subject fixates the target with the fovea or another part of the retina, the image of the fovea or the other part of the retina must automatically be superimposed exactly upon the target at that level within the tube. The superimposed images upon the photographic film must then accurately represent the same relationship.

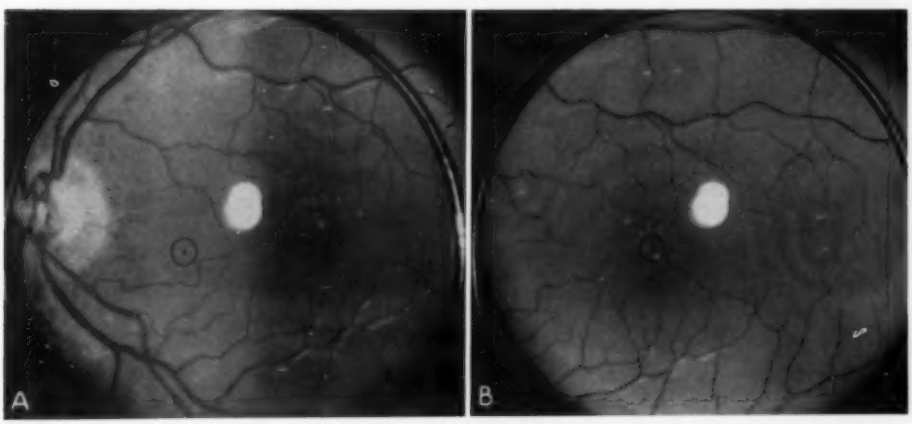

Fig. 2 (von Noorden, Allen and Burian). (A) Fundus photograph showing eccentric fixation with an area between disc and macula. (B) Fundus photograph of the identical eye after pleoptic treatment. Fixation is now central (foveolar).

The device is used as follows: The target is wiped free of dust with lens paper and placed about midway within the tube of the fundus camera. The carbon arc is struck and the operator proceeds to focus within the subject's eye as for routine photography.

When the fundus is judged to be in focus, the subject is asked to look straight ahead at the dot in the target. The subject will see the target, as diagramed in Figure 1-B, if it is not too far out of the proper plane, even though it is not in the correct position for the photography. In the diagram it is clear that when the target is between the aerial image of the fundus and the camera lens, the image of the target is located behind the photographic film. A forward position of the target would place the image ahead of the film.

The operator then moves the target along the slot (fig. 1-C) with one hand while continuing to view the fundus in the side arm focussing lens until he sees the cross hairs of the camera, the fine vessels of the fundus and the target, all three, in equally sharp focus at exactly the same time. This maneuver and the final relationship of the subject's fundus, the target and the images is represented in Figure 1-C. The photograph is taken.

Examples of the photographic results are shown in Figure 2-A and B. Figure 2-A represents eccentric fixation in a patient before pleoptic treatment was initiated. The patient localized the target to be straight ahead although an eccentric area was used for fixation. Figure 2-B represents the same eye after a change of localization had occurred as a result of pleoptics. When asked to look at the target straight ahead the patient was now using the fovea. Visual acuity improved subsequently.

Frequent examinations of the fixation behavior are essential at the beginning, during, and at the termination of pleoptic treatment. Fundus photography with our fixation object has provided us with a good method for obtaining permanent records to follow the progress of the patients during such treatment. It has also overcome the optical limitations of the visuscope, inasmuch as with photography a larger area of the fundus is visualized showing clearly the anatomical relation of the eccentric area to the disc or other landmarks.

Summary

A photographic method is described which makes it possible to determine accurately the retinal area used for fixation, and to obtain a permanent record of it. This is of value in diagnosis and for the follow-up of patients undergoing pleoptic treatment.

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GLAUCOMA DETECTION*

In a general hospital clinic

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In recent years mass screening projects for the detection of glucoma have been conducted in various cities under different auspices and by different mass techniques. The well-known Philadelphia[1] industrial plant and Cleveland[2] city-wide surveys have stimulated investigators throughout the country.

A recent report from the San Diego County Medical Society[3] of a 10-day survey at the San Diego County Fair, Del Mar, California, demonstrated the popularity of such tests with the general public, in that 3,986 persons were tested by a team of 23 ophthalmologists and 40 assistants working in shifts for 12 hours a day for 10 days. We have heard of other surveys that have been or will be instituted in New Jersey and on Long Island.

Another type of study, aided by medical students,[4] has been undertaken in the Outpatient Clinics of the University of Tennessee School of Medicine. Routine tonometry, with subsequent special studies, was done on 1,120 patients without eye symptoms. Of these, 313 persons with elevated tensions were discovered. For various reasons only 259 were retested and 49 or 4.0 percent were proven to have glaucoma.

Emotional factors have long been known to influence glaucoma, as is the case in numerous other diseases. This consideration led to the planning of a glaucoma detection project among the patients in the various clinics of the Jewish Hospital of Brooklyn, The Brooklyn Hebrew Home and Hospital For The Aged and the diabetes group at the Brownsville Health Center. It was our purpose to try to discover any predominance or lack of glaucoma cases among those patients who were suffering from diseases that may have had a psychosomatic origin. A team of physicians and one technician did routine tonometries, followed by tonographic, campimetric and peripheral field studies where indicated.

During the 11-month period from August 1, 1957, to and including June 30, 1958, 964 patients were tested for glaucoma. Of these, 679 patients were examined at the Brooklyn Jewish Hospital, 93 at the Brooklyn Hebrew Home and Hospital for the Aged, and 192 at the Brownsville Health Center.

Table 1 shows the distribution of the persons tested according to five groups that range from 20 years to over 65 years:

After testing 964 patients, nine of whom were discovered to have been previously diagnosed as having glaucoma, 3.1 percent (30) of the remainder were newly diagnosed glaucoma patients. Thirty-six suspects discontinued observations for various reasons and it must be assumed that another one or two cases probably exist in this group.

Table 2 presents an analysis of the 103 suspects, including the nine with known glaucoma and the 30 with newly diagnosed glaucoma, according to their medical diagnoses:

Of the 30 new cases of glaucoma, 26 were wide-angle chronic simple glaucoma and four were narrow-angle.

It will be noted that highest incidences of 7.0 percent and 6.9 percent occurred in the hypertensive and diabetic groups. Obviously, the volume tested is far too small to permit any statistical conclusion. The results are of some interest, however, and they suggest certain channels for further investigation concerning incidence rates and the possible role of neurovegetative influences as etiologic factors in glaucoma.

* From the Jewish Hospital of Brooklyn. This project was made possible by a grant from the United States Public Health Service.

TABLE 1

DISTRIBUTION ACCORDING TO AGE

Age Groups	Below 34 (yr.)	35–44 (yr.)	45–54 (yr.)	55–64 (yr.)	65 and over (yr.)	Totals
No. examined	189	203	148	159	265	964
No. of suspects	6	11	21	22	43	103
Suspects proven positive and referred to clinic	1	4	7	10	8	30
Suspects proven negative	2	1	4	5	5	17
Suspects kept under observation	0	1	3	2	5	11
Suspects who discontinued observation	3	5	7	5	16	36
Known glaucoma cases	0	0	0	0	9	9

TABLE 2

DISTRIBUTION ACCORDING TO MEDICAL DIAGNOSES

	Total Tested	Suspects	Known Glaucoma	New Glaucoma	New Case Rate (%)
1. Gastro-intestinal diseases	164	29	1	6	3.7
2. Hypertensive diseases	128	20	1	9	7.0
3. Diabetes	58	12	3	4	6.9
4. Arthritis	63	6	1	1	1.6
5. Allergies (including asthma)	14	1	—	—	0.0
6. Peripheral vascular diseases	37	3	—	1	2.7
7. Gynecologic, general surgical, orthopedics, neurologic, genitourinary and cardiac	205	14	—	5	2.4
8. No medical complaints	295	18	3	4	1.4
TOTALS	964	103	9	30	3.1

SUMMARY

1. A study of 964 general clinic patients revealed an incidence of 3.1 percent (30) patients of previously unknown cases of glaucoma.

2. The hypertensive, cardiovascular, and diabetes groups had the highest percentages of undiscovered cases of glaucoma.

3. The patients are all being followed in the glaucoma clinic. A few probable positives among the suspects who have failed to return for complete evaluation are representative of the group in the general population that will always present a challenge to the social worker, who can be of considerable aid in all clinical projects.

One Nevins Street (17)

We wish to thank Mrs. Anita Goodstein for her technical assistance. We also extend thanks to Dr. Theodore Rosenthal, New York City Health Department, for his advice and aid.

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ANTIBIOTICS IN HERPES SIMPLEX*

And an experimental and clinical investigation of cycloserine

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and

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Herpes corneae has been described as the most important specific keratitis in the United States.[1] Skillful diagnosis of its protean forms is within the scope of many ophthalmologists. However, diagnostic acumen often succumbs to therapeutic inadequacy.

In an age when anti-infective agents have rendered commonplace the cure of infection, no specific antiherpetic agent has illumined our scene. Iodine or ether cautery, vaccination, keratoplasty and other approaches are frequently curative and admirably performed. Yet none are directed to the specific control of the herpes simplex virus.

Early reports of success with an anti-infective agent, aureomycin, were promising[2-4] but have not been borne out in clinical practice over the succeeding years.

In 1948, Braley[2] first used aureomycin in the treatment of four patients with dendritic keratitis. In two patients, the disappearance of the ulcer was effected within 24 to 48 hours, improvement was noted in the third, and no change in the fourth patient. Thus was activated an intensive study of this drug with regard to herpes simplex. Braley followed his original clinical observations with a series of experimental animal studies[5] which showed that aureomycin had some neutralizing effect on a herpes strain used intracerebrally in mice and rabbits. In 1955, MacKneson and Ormsby[5] showed that of a large group of antibiotics tested, only aureomycin, in relatively high concentrations, exhibited in vitro inhibition of herpes simplex virus. They suggested that aureomycin was the antibiotic of choice in the ancillary treatment of herpes corneae.

Not all investigators had such encouraging results. Geller and Thygeson[6] noted no beneficial effects of topical aureomycin in the treatment of herpes keratitis in rabbits, nor were they able to find any in vivo inhibition of the virus. Duke-Elder,[7] too, reported no improvement in dendritic keratitis with aureomycin therapy, and found it useful only insofar as it prevented secondary infection.

Although the early hopes for aureomycin have not materialized, continued impetus to further drug investigations has persisted.

In 1956, Lillick[8] reported encouraging results in the treatment of herpes labialis with cycloserine, a new antibiotic.†

Cycloserine is produced by a strain of Streptomyces orchidaceus and had previously been found most active against tuberculosis, as well as both gram-positive and gram-negative organisms.

On the basis of Lillick's report describing the aborting of frequently recurring attacks of herpes labialis and preventing its progressive course, it was decided to investigate, in both clinical and experimental trial, the effects of cycloserine on herpes corneae.

Clinical study

Ten patients were selected solely on the basis of the typical nature of their presenting lesions. Of these, eight had classical dendritic figures when first seen and the re-

* From the Manhattan Eye, Ear and Throat Hospital.

† We are indebted to S. N. Gellis, M.D., of the Lilly Research Laboratories for supplying cycloserine to us in capsule and ophthalmic ointment form.

maining two had typical active disciform keratitis with a documented history of previous dendritic keratitis.

Cycloserine ointment (5.0 mg./gm.) was administered topically every waking hour for two days, then every two hours thereafter for a total of seven days. In addition, cycloserine capsules 250 mg. were taken orally every 12 hours for seven days.

In the series of eight patients with typical dendritic lesions, seven exhibited no response to treatment and continued to progress, requiring iodine cautery at the end of the seven-day course. The eighth patient had received cautery treatment three years prior and presented with a very recent recurrence of typical dendritic keratitis of only three days' duration. After 48 hours of cycloserine treatment, the cornea was completely healed and the ulcer disappeared.

The two patients with disciform keratitis did not respond to cycloserine treatment despite a protracted course of therapy.

Experimental Study

A parallel rabbit study was undertaken to demonstrate the efficacy of cycloserine under controlled laboratory conditions. Culture material was taken by scraping the corneas of seven patients with typical dendritic lesions.

Under topical anesthesia a rabbit cornea was scarified with four cross hatches of vertical and horizontal strokes made with a sharp scalpel point, with care not to penetrate beyond the epithelial layers. A spatula containing the inoculum was then rubbed into the scarified area. Thirty percent sodium sulfacetamide solution was instilled to prevent contaminant infection.

Of 15 rabbits so inoculated, seven developed a keratoconjunctivitis with dendritic lesions (illustrating the difficulty of rabbit cultures). Only these seven were treated with cycloserine ointment instilled four times daily for seven days. Disappointing results were noted, as four rabbits continued on to produce disciform type lesions and final partial opacifications, with the remaining three exhibiting clearing of the cornea after a protracted course.

Comment

The virus of herpes simplex is an intracellular parasite. Once entrance is gained within the cell, it is less vulnerable to antiinfective agents. It is interesting to note that the one patient cured presented with a very early lesion of less than three days' duration as against seven to 14 days' duration prior to treatment among the failures. Perhaps in early cases the virus has not yet adapted or consolidated its active state within the cell and thus is rendered more vulnerable. However, such early treatment of cases is fortuitous and infrequent due to the usual lack of early symptoms and consequent late appearance of the patient for therapy. Thus cauterization remains the only effective treatment of dendritic keratitis available today, it being drastic but definitive.

It should be noted, however, that the antiinfective approach be it chemotherapeutic or antibiotic, has not been without success in the treatment of intracellular organisms, notably against Rickettsia and the atypical viruses of the psittacosis, trachoma, and lymphogranuloma venerum group. Still possible and to be sought is a virucidal agent, which can enter the cell without destructive effect, for the direct successful treatment of herpes corneae.

Summary

The present status of antibiotic treatment of ocular herpes simplex is reviewed and the results of clinical and experimental trials with the antibiotic cycloserine are presented. Although a negative report, it will have positive results if it stimulates further interest and investigation of the direct, anti-infective approach to the problem of herpes corneae.

9 Central Street.

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POSTOPERATIVE INFECTIONS IN AN OPHTHALMOLOGIC HOSPITAL*

With comments upon bacteriophage typing of staphylococci as a preventative tool

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Because of constant attention to minute detail, postoperative infection is a rare occurrence in ophthalmology. The recent appearance of antibiotic-resistant staphylococci as the cause of many nosocomial infections, both medical and surgical,[1] makes a current assessment of this problem of some interest.

This report is based upon a survey of the experience following 8,038 operations at the Institute of Ophthalmology of the Presbyterian Hospital in the city of New York, from January 1, 1956 to December 1, 1958. The institute is geographically separate from the other hospitals of the Columbia-Presbyterian Medical Center, and all the patients are ophthalmologic, except in unusual emergencies. The staff of attending physicians, the residents and graduate nurses infrequently attend patients in other areas of the Presbyterian Hospital. The student nurses, however, rotate through the various services at short intervals.

For the three years mentioned, I have been the representative of the Department of Ophthalmology on the Presbyterian Hospital Wound Infection Committee, with the responsibility of studying all cases of postoperative infection. Cases have been collected by maintaining liaison with the resident and attending physicians, and with the laboratory. In a suspected case of infection, I examined the patient whenever possible. Otherwise, information was obtained from the hospital chart.

Two difficulties in assembling the data must be mentioned. First, the diagnosis of postoperative infection is usually obvious, but at times the differentiation of intense postoperative reaction to trauma from bacterial infection is very difficult. I have made the final decision in all cases. This has necessitated exclusion from this series of five intraocular operations with brisk inflammation in which postoperative infection was suspected, but a definite diagnosis was not possible, and all but one squint case, in which actual tissue

* From the Institute of Ophthalmology, Presbyterian Hospital, New York. Aided in part by a research grant #E-1997 (R1) from the National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, Maryland.

YEAR	TOTAL OPERATIONS	WOUND INFECTIONS		CATARACT OPERATIONS	CATARACT POSTOPERATIVE INFECTIONS		FINAL RESULT		
		NUMBER	%		NUMBER	%	ENUCLEATED OR EVISCERATED	SAVED WITHOUT USEFUL VISION	USEFUL VISION
1956	2669	3	0.11	901	1	0.11	1	0	2
1957	2811	5	0.17	939	3	0.32	3	1	1
1958 (to Dec. 1)	2558	3	0.12	855	1	0.12	1	2	0
TOTAL	8038	11	0.14	2695	5	0.19	5	3	3

Fig. 1 (Burns). Total number of cases collected.

loss occurred, despite the not unusual occurrence of increased swelling and redness some days after muscle surgery. This difficulty of establishing a definite diagnosis of postoperative infection is not new.[2] Probably the only accurate method available would be to isolate a suspected organism and determine if there was a rise in antibody titer to this specific organism in the convalescent serum. The second unanswerable objection is that all cases of postoperative infection may not have been discovered, since such an occurrence is not one that lends itself to wide publicity.

The total cases collected are listed in Figure 1. A generally low incidence, with no unusual rise during the three years, has been found. In order to compare with previous reports from this institution,[3] the results in the cataract cases alone are listed.

ORGANISM	NUMBER OF CASES
STAPHYLOCOCCUS AUREUS	8
STAPHYLOCOCCUS ALBUS	
with Proteus vulgaris	1
with Penicillium sp. fungus	1
STAPHYLOCOCCUS, UNKNOWN TYPE	
overgrown by Proteus vulgaris	1

Fig. 2 (Burns). Bacteria cultured from 11 cases of postoperative infection, 1956-1958.

Bacteria were cultured in all 11 postoperative infections (fig. 2). The preponderance of the Staphylococcus aureus is notable, being found in pure culture in eight cases, while a mixed staphylococcic infection occurred in the remaining three. In five cases the organism was generally antibiotic sensitive, in five cases resistant to most or all antibiotics tested, and in one instance sensitivity testing was not done.

Preoperatively, prophylactic antibiotic ointment was given locally in four of the 11 cases, and seven received none. None were given antibiotics at the time of surgery, and all were vigorously treated with numerous local and systemic antibiotics after the diagnosis of infection was made. However, only three eyes (fig. 1) retained useful vision. In one, a strabismus operation that had conjunctival ulceration postoperatively, the globe was never involved. Two cases of corneal abscess and hypopyon developing after cataract surgery had a good visual re-

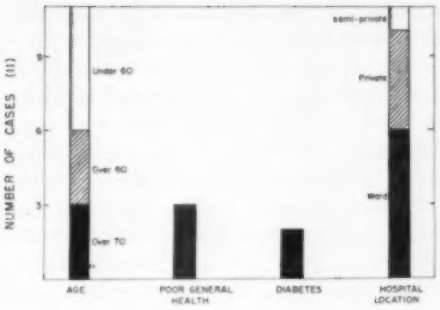

Fig. 3 (Burns). General condition of the patient in 11 cases of postoperative infection.

sult.* Recently, prophylactic antibiotics at the time of surgery have been advocated in some selected cases.[4,5] However, in other controlled studies, routine prophylactic antibiotic therapy has been condemned.[6,7]

The pertinent factors in the patient's overall status in the 11 cases are assessed in Figure 3. In this small series, age, and general physical condition did not seem to be important. However, in one patient with diabetes, corneal abscess and hypopyon developed following cataract extraction. The patient had been transferred to the Institute of Ophthalmology from a surgical ward, where he had been treated for a draining osteomyelitis of the foot. This event occurred before a bacteriophage typing was done, so it was not possible to tell whether the pedal and ocular staphylococci were of the same strain.

An element of some importance is that six of the 11 infections occurred in ward patients in 12 bed wards, which comprise 24 of the 92 beds in the institute. The increased incidence of postoperative infection in ward patients has been noted before[8] and implies a number of factors in addition to bacterial cross-contamination from large numbers of occupants; among these are prolonged illness, poorer physical health, depressed economic status, suboptimal nutrition and neglected hygiene.

Four of the 11 cases were operated on by residents and seven by attending physicians. Faulty technique appeared to play a role in only two instances. Errors of judgment occurred in three cases. One was the abovementioned diabetic and two were cataract extractions in which endophthalmitis occurred through a leaking wound over a year after surgery. In such cases, Dunnington and Regan[9] have emphasized the importance of early repair of fistulizing wounds.

Ocular factors seemed of much greater importance (fig. 4). The type of operation varied, but it was notable that six of the 11 infections occurred in those with "weak ocular tissue." This term is meant to include such conditions as high myopia, congenital nystagmus, retinal degeneration and detachment after uneventful cataract extraction in nonsenile patients. Another striking finding was that the infection occurred after the second operation on the same eye in five of the 11 cases, for example, cataract extraction after glaucoma surgery, retinopexy after cataract surgery, or a second glaucoma operation. A possible explanation

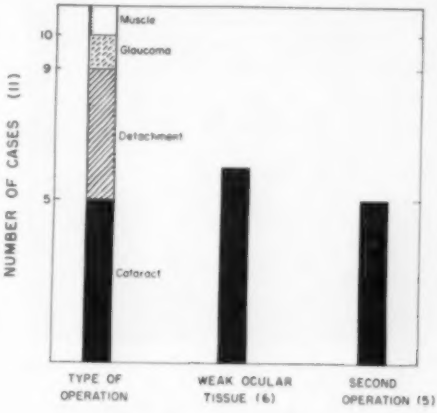

Fig. 4 (Burns). Ocular factors in postoperative infection.

* It may be worthy of note that two patients developed severe complications of the antibiotic therapy, one monilial oral ulceration and the other staphylococcic gastroenteritis.

I	29	52	52A	79		42D IV
II	3A	3B	3C	55		
III	6	7	42E	47	53	54
	70	73	75	77	42B	VA 4
MISC.	80	81				47C

Fig. 5 (Burns). Pattern showing numbers of typing phages and their distribution on a Petri dish.

for the preponderance of these two factors lies in the "adaptation syndrome" of Selye,[10] wherein tissue resistance to stress is exhausted by the first operation or by weakness of tissue before operation, thus predisposing to wound infection as a subsequent stressing agent.

Since the importance of staphylococci as an agent of ocular wound infection has already been established,[8] it seemed advisable to assess the role of the staphylococcus by the method of bacteriophage typing, an epidemiologic tool of great recent interest. Briefly, the technique consists in maintaining a stock of 24 different strains of bacteriophages, which are viruses specifically able to multiply on and kill one strain of staphylococcus. An unknown culture of coagulase-positive staphylococcus is plated on agar and a drop of each bacteriophage, distinguished by number, is placed in a predetermined location (fig. 5). If an unknown bacterium is lysed by one or more phages, it is listed as being of the type of the lysing phage (figs. 6-a, b, and c). A strain lysed by only one bacteriophage is less common than multiple lysis, spoken of as the "lytic pattern"[11] (fig. 7). Successive generations of bacteria maintain a similar lytic pattern, hence a bacteria can be "finger printed" by its lytic pattern and its spread evaluated.

It was proposed to culture cataract patients preoperatively and postoperatively, to determine if these patients were carriers of typable strains of staphylococci, and if these

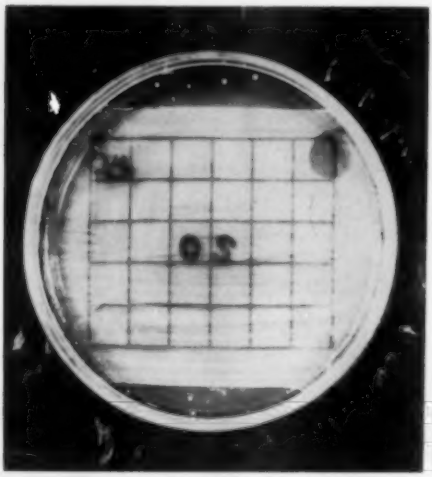

Fig. 6a (Burns). Phage typing of coagulase-positive Staphylococcus aureus type 42 D isolated from the left eye of a patient who developed orbital cellulitis after retinopexy for aphakic retinal detachment in a highly myopic eye. (For location of lytic plaque see Figure 5.)

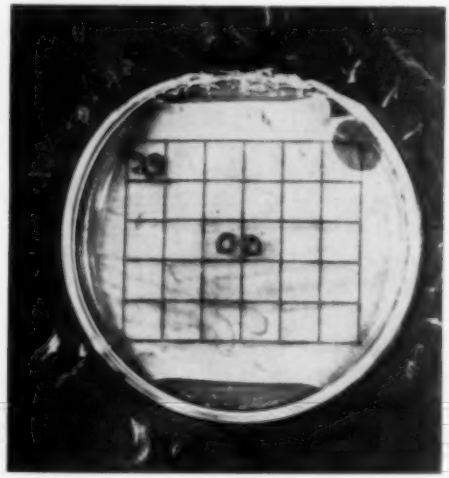

Fig. 6b (Burns). Phage typing of coagulase-positive Staphylococcus aureus type 42 D isolated from right eye of a patient who developed orbital cellulitis after retinopexy for aphakic retinal detachment in a highly myopic eye. (For location of lytic plaque see Figure 5.)

staphylococci were responsible for postoperative infection, or whether external sources such as personnel, air or fomites were to blame. It was felt that this technique might aid in preventing an epidemic of wound infections.

As a preliminary procedure 287 typings were done on coagulase-positive staphylococci obtained from the Surgical Bacteriology Laboratory of Presbyterian Hospital. These were principally from postoperative infections but also from out-patient sources, personnel and hospital air. By comparing the results with those of another laboratory, it was determined that the typing technique was reliable.[12]

In agreement with results reported elsewhere,[13] a high percentage of typable strains was found (fig. 8), and although 26 percent of the strains typed were of the "80-81 epidemic type,"[1] no preponderance of infections were noted from this bacterium. However, the general spread of the "epidemic" organism through the hospital, its air and personnel, and to the community, as noted in out-patients, was found.*

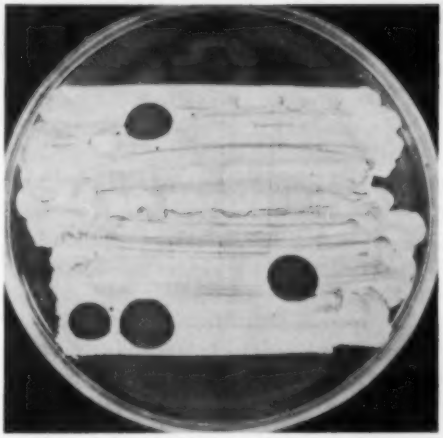

Fig. 7 (Burns). Four lytic plaques identifying a coagulase-positive Staphylococcus aureus as type 52-42 B -80-81. (See Figure 5.)

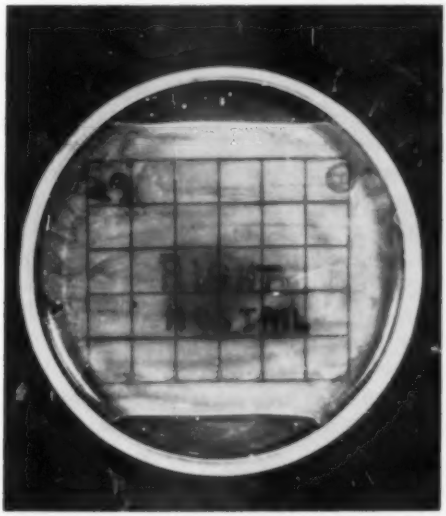

Fig. 6c (Burns). Phage typing of coagulase-positive Staphylococcus aureus type 42 D isolated from right nostril of a patient who developed orbital cellulitis after retinopexy for aphakic retinal detachment in a highly myopic eye. (For location of lytic plaque see Figure 5.)

Starting in February, 1958, 177 preoperative cataract patients had conjunctival cultures done on both eyes the day before sur-

* It has been the experience of the Presbyterian Medical Center that a relatively low (approximately one percent) incidence of postoperative infection is prevalent. No known serious epidemics of staphylococcal infection due to a particular phage type have occurred.[14] This probably modifies the experience of the Institute of Ophthalmology as a separate hospital of the Medical Center.

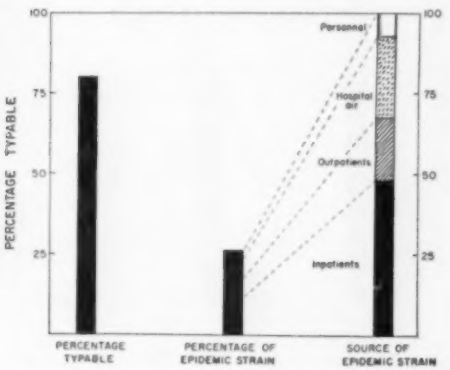

Fig. 8 (Burns). Results of bacteriophage typing of 287 staphylococci from bacteriology laboratory.

gery by rubbing a broth moistened cotton swab over the lower conjunctival cul-de-sac and lashes, and streaking on blood agar. The plate was incubated overnight at 37°C., and read for numbers of staphylococci, hemolysis and pigment production. However, hemolysis and pigment production were not considered adequate criteria of pathogenicity.[11] The positive cultures on either eye were subjected to tests for mannitol fermentation on Difco Mannitol agar, and for coagulase production in outdated blood bank plasma diluted 1:3 with saline. Only mannitol or coagulase-positive staphylococci were phage typed.[11] Typability with the bacteriophages used in a criterion of pathogenicity.

Eighty-eight of the patients were in private rooms, 26 in two or four bed semiprivate rooms, and 63 in 12-bed wards. Approximately one third had received local antibiotics before hospital entry. After hospital entry and cultures had been taken, an antibiotic ointment, usually a polymyxin-bacitracin mixture, was applied to the lower conjunctival cul-de-sac every two hours while awake until surgery the next day. The surgeon was not informed of the result of the preoperative culture, and operation was done despite the results of the culture, except in one case described below.

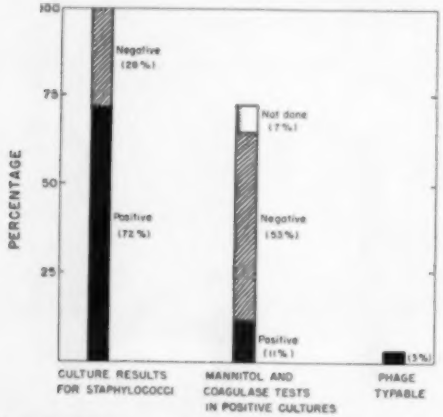

Fig. 9 (Burns). Results of preoperative cultures in 177 cataract patients.

Preoperative cultures were positive in 128 (72 percent) and negative in 49 (28 percent) of the cases. Of the positive cultures, mannitol and coagulase typing was done in all but 13, usually those with but a single colony present. Of the positive cultures, 94 were mannitol and coagulase negative, thus not phage-typable, and 19 were either mannitol or coagulase positive and subjected to phage typing. Three-fourths of these were nontypable with the bacteriophages used. The phage types established were the 80-81 epidemic strain three times, 42 B and 75 once each (fig. 9).

Postoperative cultures were done about seven to 10 days later on a majority of the patients after the dressing was removed. It was notable that the operated eye was often sterile and usually had fewer bacteria than the unoperated eye. This may have been due to the frequent use of a neomycin-hydrocortisone ointment at the time of dressing change. Bandaging did not seem to act as an "incubator" to increase the number of bacteria under these circumstances.

Insofar as the technique applied to wound infection, it was of value in only one case, where a postoperative infection was found to be due to a coagulase positive Staphylococcus aureus type 42 D, an unusual organism. Because this patient had been operated on for retinal detachment, preoperative cultures were not done. Postoperatively, the same 42 D staphylococcus was found in the unoperated right conjunctiva and the right nostril (fig. 5). Since this patient was an aphakic high myope undergoing a second operation, it was concluded that local factors such as trauma of multiple operations applied to weak tissue were primarily responsible.

It was found that the "epidemic" 80-81 stain could be cultured preoperatively and postoperatively in two patients who underwent perfectly uneventful postoperative courses with no sign of undue inflammation. Indeed, one retinal detachment patient, not

in this series, with furunculosis from which the "epidemic" strain was cultured, seeded his environment so heavily that an uncovered 100-mm. diameter Petri dish left on his bedside table for one-half hour grew 92 colonies of staphylococci. Of these, four were typed and three were the "epidemic" 80-81 strain. Yet no staphylococcic personnel or patient illness or postoperative infection was noted in his area.

In the other two infections developing during the period when phage typing was available, one was due to a coagulase-negative Staphylococcus albus combined with Proteus vulgaris contamination of a draining sinus due to nonabsorbable suture in a patient who underwent detachment surgery on an aphakic eye, and the other was due to infection by nontypable Staphylococcus aureus of a cystoid scar left unrepaired for two years in a cataract wound.

One operation in this series was postponed because of the possibility of infection. This was a diabetic who entered the hospital with uncontrolled diabetes and an infected toe. Pseudomonas aeruginosa was cultured from the toe and both eyes, and the patient was discharged unoperated. History and physical examination would have alerted the staff to this possible complication. Seven patients underwent uneventful operations despite Proteus vulgaris in preoperative cultures.

Comment

In this study of postoperative infection, it is noted that errors of technique and judgment can lead to infection with great rapidity and disastrous results. Vigilant care must be exercised at all times to avoid infection.

Apart from professional personnel failure, it is noted that the most common factors in postoperative infection are "weak ocular tissue" and multiple operations. In such patients, consideration might be given to vigorous prophylactic antibiotic therapy, sparing tissue of excessive trauma and avoidable nonabsorbable suture and foreign body implantation.*

Routine bacteriologic study of preoperative patients did not seem to be of great help in this study. The bacteria isolated from the clinically noninfected eye were often of low pathogenicity by laboratory tests and, in confirmation of this finding, were not found to be responsible for postoperative infection.

In treatment of postoperative infection in ophthalmology, since Staphylococcus aureus is so frequently encountered and usually antibiotic resistant, and time is so important in determining outcome of the result, rather than awaiting laboratory culture of the offending organism with testing for antibiotic sensitivity, consideration might be given to immediate treatment of the infection with kanamycin, ristocetin or vancomycin.[15] However, if the infection is primarily due to excessive tissue trauma, congenitally poor ocular tissue or an implanted foreign body, the choice of antibiotic is of much less importance.

Summary

1. A study of postoperative infections over a three-year period in an ophthalmologic hospital has been carried out.

2. Staphylococci were isolated from all cases of postoperative infection, alone or in combination.

3. A bacteriologic survey of cataract patients with bacteriophage typing of staphylococci is reported.

4. A substantial proportion of the wound infections was found to be due primarily to local ocular factors such as excessive trauma and weak ocular tissue.

3181 S.W. Sam Jackson Park Road (1).

Acknowledgment

The parent strains of bacteriophage and staphylococci were furnished by John E. Blair, Ph.D.,

* A frequent factor in wound infection in neurologic and orthopedic surgery at this institution has been a nonabsorbable foreign body such as a polyethylene tube used for drainage of cerebrospinal fluid or metal used in internal fixation of fractures.[14]

of the Hospital for Joint Diseases, New York, who was most generous with counsel and advise.

Appreciation is expressed to Miss Aranka Schupler, B.S., for technical assistance; to John H. Dunnington, M.D., whose private patients were utilized in the above study; to the staff of the Institute of Ophthalmology for permission to examine patients with possible wound infection; and to Deborah Locatcher-Khorazo, M.D., for cooperation in laboratory studies.

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NOTES, CASES, INSTRUMENTS

BOWEN'S DISEASE OF THE CORNEA*

A CASE REPORT

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AND

ARNOLD I. TURTZ, M.D.
New York

This case of Bowen's disease of the cornea is of interest, not only because of the rarity of the disease but because it was able to masquerade as several other conditions. It was only by biopsy that its true nature was revealed, and was found to be not an innocuous lesion at all but a carcinoma in situ.

CASE REPORT

The patient, a 32-year-old registered nurse, first consulted an ophthalmologist during the seventh month of gestation because of a growth in the left cornea. She was told that it was a pterygium and should not be removed because of her pregnancy. The lesion was cauterized five times during the next year but kept recurring.

At a university ophthalmologic center, the lesion was next diagnosed as a vitamin deficiency and for seven months injections of vitamin B_{12} and oral administration of vitamin B-complex were given to no avail.

The third ophthalmologist consulted diagnosed the lesion as allergic in nature and prescribed topical cortisone which was religiously applied for a seven-month period.

* From the Manhattan Eye, Ear and Throat Hospital.

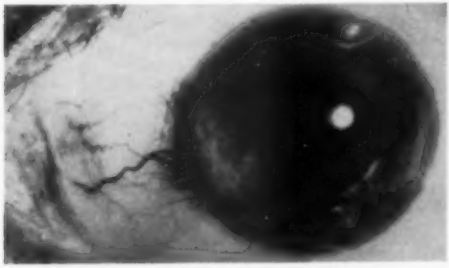

Fig. 1 (Lewis and Turtz). A preoperative photograph.

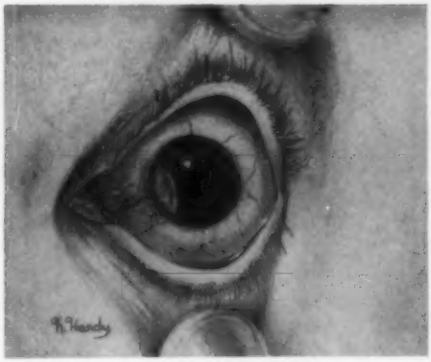

Fig. 1a (Lewis and Turtz). Drawing of the preoperative appearance.

Discouraged by a lack of response, a fourth specialist was seen and again a diagnosis of an allergic lesion was made and steroid therapy was again prescribed and tried for a six-month period.

When the patient was seen at the Corneal Clinic at Manhattan Eye, Ear and Throat Hospital, her history presented a challenge. The lesion therefore received special scrutiny. It presented a raised, gelatinous appearance on the nasal portion of the cornea (figs. 1 and 1a) extending four mm. from the limbus. The nasal two-thirds of the lesion was vascularized. The remainder was turbid looking and had an abrupt line of demarcation.

A biopsy was done by shaving off the elevated portion. The pathology report read:

Specimen: cornea, O.S. Gross specimen consists of two pieces of tissue measuring 1.5 mm. in

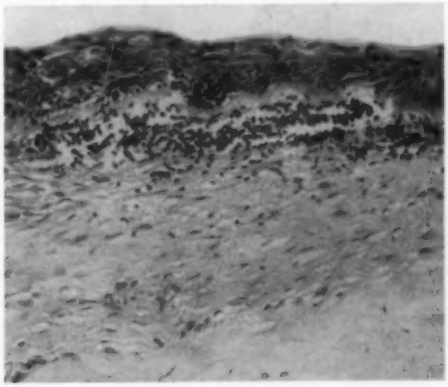

Fig. 2 (Lewis and Turtz). Photomicrograph of section of biopsy.

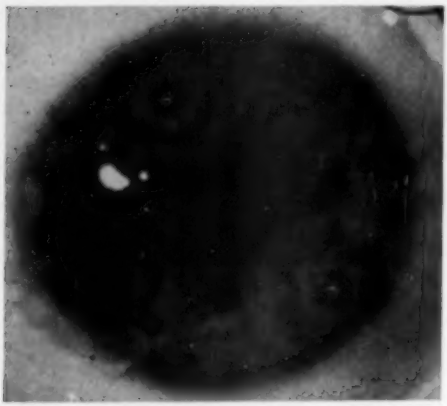

Fig. 3 (Lewis and Turtz). Postoperative appearance.

diameter. Microscopic sections reveal a small fragment of tissue with anaplastic epidermoid cells which exhibit anisocytosis, hyperchromasia, and mitosis. The specimen consists chiefly of anaplastic epithelium without subepithelial structures. Diagnosis: epidermoid carcinoma—Grade III. Figure 2 is a photomicrograph of one of the slides.

After this report the lesion was widely excised to include one half of the corneal thickness and a portion of the sclera and conjunctiva. A generous portion of normal tissue was taken on all sides of the lesion, and a lamellar graft was sutured in place to fill the defect. Four months after the operation the cornea was well-healed, without any evidence of recurrence (fig. 3).

Summary

Carcinoma in situ of the cornea (Bowen's disease) should be considered in the differential diagnosis of corneal lesions. It may resemble a pterygium, nutritional deficiency, or an allergic lesion.

It is our belief that wide localized excision of these lesions, and replacement by keratoplasty is the treatment of choice.

502 Torrance Boulevard.
210 East 64th Street (21).

COMPLETE AVULSION OF THE OPTIC NERVE

Associated with severe concussion injuries to the eyes

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One of the rare manifestations of a severe injury to the eye is avulsion of the optic nerve, and it is probably diagnosed even more rarely because there is usually so much associated intraocular hemorrhage that any fundus details are completely obscured. The following case report is instructive because it shows a complete avulsion of the optic nerve and also demonstrates the teamwork that is necessary in the management of a case of severe, multiple injuries. The patient must be treated as a whole; no one individual is capable of taking complete care of such a patient.

Case report

A 25-year-old woman, who was a passenger in the front seat of a car, was involved in a head-on collision with another car while travelling home late one night. Her head was thrown forward against the dashboard with great force but she was not knocked unconscious. On admission to the hospital it was obvious that she had severe injuries to the skull, facial structures, and the long bones. The oral surgeon, general surgeon, orthopedic surgeon, and the ophthalmologist were called in to assess the patient's condition. She had extensive lacerations of the upper lip and the labial and buccal vestibule of the upper jaw. There was a marked loss of the normal facial contour and the maxilla was a loosely floating segment.

X-ray films of the skull showed a compound fracture of the body and arch of the right zygoma through the zygomatico-maxillary and zygomatico-temporal sutures, depressed and impacted into the antrum; a compound comminuted fracture of the right maxilla through the infraorbital foramen; a compound comminuted fracture of the left maxilla through the infraorbital foramen and the floor of the orbit; a simple comminuted fracture of the left zygoma through the zygomatico-temporal and zygomatico-frontal sutures; a complete horizontal compound comminuted fracture of the maxilla, through the floor of the nose, with severe displacement; a compound comminuted fracture of the nasal bones with displacement of the left nasal bone into the orbit. She also had fractures of the tibia and fibula in both legs, the left os calcis and the right radius.

The eye examination revealed extensive ecchymoses of the lids and bilateral subconjunctival hemorrhages. The left eye was proptosed downward due to a retrobulbar hemorrhage and had no light perception. The vision in the right eye was stated to be blurred. There was some restriction in motility of the right eye and the left eye was practically immobile. The right pupil was normal but the left pupil was nonreactile and slightly dilated. The right cornea and anterior chamber were normal. The left cornea was abraded, a small hyphema was present, and the anterior chamber was very deep. The left globe was very soft to palpation.

In the right eye the vitreous was clear and the fundus showed a round superficial hemorrhage, a little larger than the disc, which covered the temporal edge of the disc and the retina adjacent to it. There was also a small subhyaloid hemorrhage along the inferior temporal vessels and many small hemorrhages between the disc and the macula.

The left eye showed a red reflex only and no fundus details could be seen.

It was decided that the immediate responsibility for the patient lay with the facio-maxillary and orthopedic surgeons. It was thought that the globe was ruptured, probably at the entrance of the optic nerve, because of the loss of light perception, the soft tension, and the deep anterior chamber. No evidence of perforation could be seen in the anterior part of the eye and there was no wound of the conjunctiva. Atropine and Neosporin ointment were put in the left eye and it was covered with a firm dressing.

A tracheostomy was performed to prevent an obstruction to the airway from an edema of the pharynx which was anticipated following the surgery. The facio-maxillary sugeon applied a plaster cap to the skull, and the next day under general anesthesia he reduced the numerous facial fractures, and immobilized the maxilla by means of a prefabricated acrylic splint applied to the teeth of the upper jaw which was fixed to a vertical bar attached to the skull cap. The zygomatic fractures were reduced by means of bilateral Caldwell-Luc procedures, using inflated balloons within each antrum as supportive devices. At the same time the orthopedic surgeon was working on the long bones.

With all these contraptions around the face and skull it was very difficult to examine the eye and apply a dressing. In one day the cornea had cleared considerably and a few retinal vessels were seen but, at the position of the disc, was a round dark area. There were many hemorrhages in the vitreous and all over the retina. There was a heavy aqueous flare but no keratic precipitates.

Gradually over the next few days the hemorrhages in both eyes began to absorb. The retinal vessels in the left eye could be traced down to the disc but in place of the disc was a round, bottomless pit. The retina appeared intact but there was some macular edema. The eye slowly became whiter, the aqueous flare less, and the motility began to improve.

By the fourth week of her hospitalization, it could be seen that the round hole where the disc should have been was being filled in with fibrous tissue and, as this was happening, the tension in the eye was becoming more normal. The hemorrhages in the right eye were almost all gone.

By another week she had recovered sufficiently to be able to leave the hospital. At this time the right eye was completely clear except for a little degenerative change at the macula and temporal to the disc. The left eye was almost white and showed no sign of a uveitis.

She was not seen again for almost three months at which time the eye examination showed vision to be: R.E., 20/30, correctible to 20/20 with a −0.75D. cyl. ax. 15°; L.E., no light perception. The eyes were completely white. The left eye looked down slightly and there was no action in the elevator muscles, though all the other muscles had a full range of movement. The tactile tension was normal and equal in both eyes. The left fundus showed large vitreous floaters, and an intact retina with no evidence of hemorrhages. The retinal vessels were not empty as one would have expected. The hole at the disc was now completely filled in with a round mass of dense white fibrous tissue which projected forward into the vitreous like a cone. The lens was perfectly clear.

Comment

One of the amazing things about this patient, apart from her recovery, is that she never lost consciousness at any time, and she could recall every incident of the accident. She had little, if any, pain in the eye over the entire period.

From the ocular standpoint the most interesting lesion was the complete avulsion of the optic nerve, with the nerve torn out of the scleral foramen flush with the globe. If the nerve had been torn further back it would have been identifiable; in this case there was just a hole. This caused a marked hypotony, a fairly common sequel of ocular contusion which usually clears up in a few days. This hypotony was more prolonged but it gradually improved, as the hole became plugged with fibrous tissue.

An avulsion of the nerve may be produced anywhere in its course by a sharp piece of bone from a fracture of the skull (usually in the optic canal) or it may be caused by a blunt blow on the eye from in front, which forcibly stretches the nerve. The mechanism involved in this case would seem to have come from the blunt blow to

the eye. This would have caused a sudden extreme rotation and displacement of the globe, causing the nerve to be stretched and pulled out of the sclera; or maybe the weakest part of the sclera, the lamina cribrosa, gave way, causing the nerve to retract into its sheath.

SUMMARY

A case of complete avulsion of the left optic nerve is reported, showing its clinical course and the probable mechanism of its development.

35 Chestnut Street (4).

GLAUCOMA SECONDARY TO OCCLUSION OF CENTRAL RETINAL ARTERY*

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Milwaukee, Wisconsin

AND

ARTHUR WILSON, M.D.
Seattle, Washington

The following report is presented as a contribution to a small but growing number of cases of glaucoma secondary to central retinal artery occlusion. Wolter and Liddicoat† have recently summarized the literature and reported a similar case. In all previously reported cases glaucoma developed in one eye only following a clinical diagnosis of central retinal artery occlusion. Among these cases no previous history of glaucoma existed. Histopathologic features common to all were proliferation of fibrovascular tissue in the angle and rubeosis irides.

* From the Department of Ophthalmology, Marquette University Medical School and Milwaukee County General Hospital.

Fig. 1 (Holm, Sachs and Wilson). Anterior segment of the globe, showing blood in the anterior chamber and the atrophic iris.

Fig. 2 (Holm, Sachs and Wilson). High power of the chamber angle showing the anterior synechias and the proliferation of fibrous tissue and blood in the anterior chamber.

CASE HISTORY

K. T., a 75-year-old Negress, was seen at the Milwaukee County General Hospital Eye Clinic on January 3, 1957, with the chief complaint of sudden loss of vision in the right eye of three days' duration. The patient, a known diabetic of long standing, was apparently well controlled on a dietary regime and 25 units of NPH insulin daily. A previous eye examination in March, 1956, when she presented with the complaint of spots before the eyes, revealed a corrected visual acuity of 20/200 in both eyes and intraocular pressure at that time was 17 mm. Hg (Schiøtz) in both eyes. An ophthalmoscopic examination revealed vitreous haze and floaters and minimal posterior subcapsular

† Wolter, J. R., and Liddicoat, D. A.: Am. J. Ophth., **46**:182, 1958.

Fig. 3 (Holm, Sachs and Wilson). Anterior chamber angle, showing blood vessels in the iris. Most of these vessels are thick-walled and not at the anterior wall of the iris.

cataracts were present in both eyes. The left eye showed cells in the anterior vitreous. At that time impressions were: (1) recent hemorrhage in retina with cells and clots in vitreous of the left eye; (2) diabetic retinopathy in both eyes; (3) early cataract in both eyes with decreased visual acuity.

The present examination revealed no light perception in the right eye and 20/200 in the left eye. The ophthalmoscopic examination, O.D., showed the disc margins to be blurred. The inferior temporal branch of the central retinal artery appeared shiny and white. No hemorrhages were seen. Hard exudates were present in the paramacular area. There was a slight vitreous haze. O.S. was normal except for vitreous opacities. A tension taken at this time was 20/23 mm. Hg (Schiøtz).

Diagnosis was occlusion of the central retinal artery of three days' duration. No therapy was undertaken due to the long duration of the occlusion.

The patient was seen again four months later in May, 1957, because of severe pain in the right eye. The intraocular pressure was 80 mm. Hg (Schiøtz). Slitlamp examination of the right eye showed corneal edema. There were no keratic precipitates. A regime of pilocarpine and Diamox was instituted. However, pressure could not be reduced below 60 mm. Hg (Schiøtz) in the right eye. Due to the presence of severe uncontrollable pain, enucleation was performed and a prosthesis was inserted.

Histologic findings

The cornea was essentially normal except for blood on the endothelium. There was a considerable amount of blood in the anterior chamber (figs. 1, 2, and 3). The iris was atrophic, and the iris angles were completely occluded (figs. 1, 2, and 3). The iris had many blood vessels, but most of them were thick walled and not near the endothelium (fig. 2). The retina showed marked degeneration of the inner layers, and marked retinal arteriosclerosis (fig. 4). The lamina showed very little blood and there were no capillary hemorrhages. The optic nerve showed very little cupping but did show the retinal artery to be only a strand. The vein had some blood in it (fig. 5).

Comment

This case represents another of the few cases of secondary glaucoma following retinal artery occlusion. It is similar to the other cases in that there are fibrous proliferation at the angles of the anterior chamber, marked degeneration of the inner layers of the retina, and arteriosclerosis. It is different

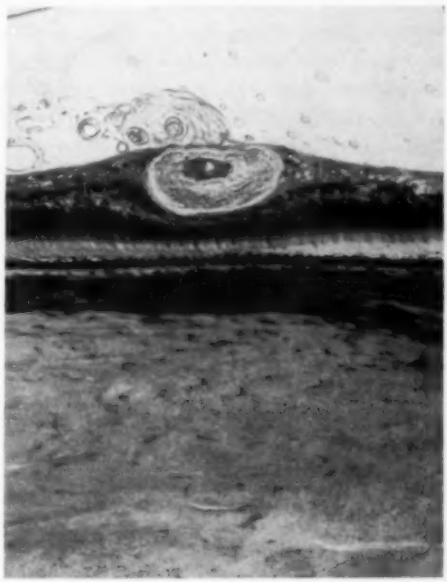

Fig. 4 (Holm, Sachs and Wilson). The thickened retinal blood vessel has very little blood in it. The ganglion cell layer is atrophic but the outer layers are fairly well preserved.

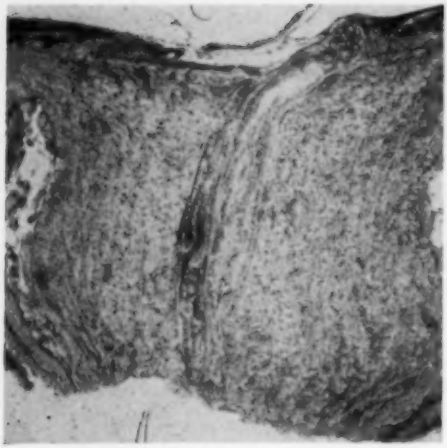

Fig. 5 (Holm, Sachs and Wilson). The optic nervehead with the artery showing as a strand. There is considerable endothelial proliferation of the vein but there is some blood in the lumen.

in that there are a few thin, newly formed blood vessels on the anterior surface of the iris.

Summary

The clinical findings and the histopathology in a case of secondary glaucoma following occlusion of the central artery of the retina are described. This case, in common with others in the literature, presented (1) fibrous proliferation of the angles of the anterior chamber; (2) marked degeneration of the inner layers of the retina; (3) monocular glaucoma following central retinal artery occlusion four months previously.

2040 West Wisconsin Avenue.

A CONFIRMATION TEST*

For refraction and muscle balance

Conrad Berens, M.D.
and
Arnold S. Breakey, M.D.
New York

The performance of refraction and checking muscle balance has been greatly facilitated by the use of an instrument which incorporates plus and minus spheres and cylinders,[1] a plus and minus 0.25 cross cylinder, and a red Maddox rod with a 0.75$^{\Delta}$ prism incorporated.[2,3] This is especially true in determining the amount of sphere and cylinder, the axis of the cylinder and examining muscle balance with the Maddox rod. Binocular checking of the final prescription for distance and near is aided by the addition of paired plus and minus 0.25 spheres, so placed that the eyes may be tested with two plus or two minus spheres alternately.

Description of instrument† (fig. 1)

At one end of a hexagonal rod 22 cm. long, there is a Maddox rod with a 0.75$^{\Delta}$ prism, with the base and amount of prism indicated. Below the Maddox rod are pairs of plus 0.25 and minus 0.25 spheres. The minus lenses are marked by red dots on each side of the glass. One set of lenses is stationary; the lower set may be adjusted to test the acceptance of both eyes simultaneously, or slid over the other spheres or cylinders thereby obtaining a 0.25 or a minus 0.25 sphere addition. At the opposite end of the rod there is a plus and minus 0.25 cross cylinder, the axis of which is in the long axis of the rod. Three centimeters below there is a plus and minus 0.25 cylinder with the axis marks clearly shown and etched on the sides of the lenses parallel with the axis marks. The minus 0.25 cylinders are marked on both sides with a small red dot.

Use of instrument

First, the plus spheres and then the minus spheres are used until the best visual acuity is obtained with the strongest plus lens or the weakest minus lens. Then, the amount of cylinder is checked, using a plus lens first and then the minus cylinder. The axis of the cylinder is checked by rotating the cross cyl-

* From the Department of Research, New York Association for the Blind and the Department of Ophthalmology, New York University Post-Graduate School of Medicine. Aided by a grant from The Ophthalmological Foundation, Inc.

† Made by E. B. Meyrowitz & Co., New York.

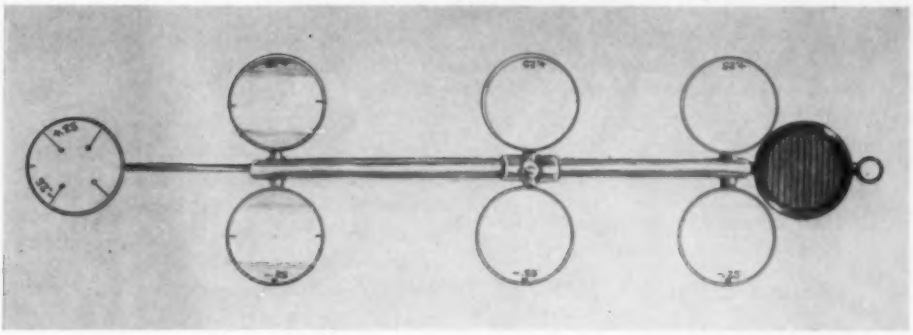

Fig. 1 (Berens and Breakey). A confirmation test for refraction and muscle balance incorporating a cross cylinder, a Maddox rod with a 0.75$^{\Delta}$ prism and plus and minus 0.25 spheres and cylinders and two plus and two minus 0.25 spheres. One set of plus and minus spheres is on a hinged slide so that they may be placed over the stationary spheres or cylinders or used paired with the spheres for checking binocular acceptance.

inder in line with the axis of the cylinder in the trial frame until the axis has been determined and where the rotation of the cross cylinder no longer improves the appearance of the letters or figures when it is turned on either side. At this time the total refraction for each eye is checked with a special "ZN" duchrome test* to be sure neither myopia or hyperopia is overcorrected. The two plus spheres are now placed before the trial frame and then the minus spheres to check the patient's binocular comfort for distant and near vision. Finally the muscle balance is checked with the red Maddox rod—first the vertical imbalance, placing the corrugation of the rod vertical, which produces a horizontal red streak of light, and then turning first one side of the Maddox rod with 0.75$^{\Delta}$ prism against the lens and then the other, and determining whether there is any hyperphoria. Usually the patients reveal that they have no vertical imbalance, that the Maddox rod line is displaced first above and then below at an equal distance from the light.

Any hyperphoria is corrected by placing the prism base-down before the right eye for right hyperphoria until the red line bisects the light. As there is a 0.75$^{\Delta}$ prism in the rod, this has to be considered in writing the final prescription.

The corrugations are now placed horizontally which produces a vertical red line of light and, if it is displaced laterally more than 0.75$^{\Delta}$ which can be corrected by rotating the rod, prisms are placed base-out for esophoria or base-in for exophoria, until the red streak bisects the light. The 0.75$^{\Delta}$ prism must be considered in writing the final prescription.

If the axes are marked on the lenses the patient is wearing, this instrument may be used to check the axes of the cylinders. The instrument is practical in determining whether a change in the sphere or cylinder is required and whether weaker or stronger addition for close work is needed. With the Maddox rod and 0.75$^{\Delta}$ prism, one may determine whether the addition of a prism or changing the amount of prism incorporated in the lens, is desirable.

Checking the adequacy of the patient's glasses in this way has been most satisfactory. It also eliminates two inherent errors, especially in patients wearing strong corrections. The first is the difference in vertex distance between the patient's own spectacles and the trial frame. The second is the elimination of the change in base curve to which the patient may have been accustomed. We recommended this device for its time-saving utility.

708 Park Avenue (21).

* Made by R. O. Gulden, Philadelphia, Pennsylvania.

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TRANSIENT MYOPIA

DURING TREATMENT WITH CARBONIC ANHYDRASE INHIBITORS

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AND

MAX M. KULVIN, M.D.

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The use of new and powerful medications is often complicated by untoward side-effects which are not generally recognized or suspected. One year ago we were presented with a puzzling example of this phenomenon which has become clearer in the light of recent case reports selected from the ophthalmic literature.

A 27-year-old white man, who was previously known to be emmetropic with 20/15 vision in either eye, experienced rapid onset of blurred vision over a 10-hour period. The vision deteriorated in this time to 3/200 although the near visual acuity remained normal.

Examination was performed without the benefit of any diagnostic instruments at the time when vision was most severely compromised. At this time no abnormality could be found. The next morning his vision had improved to 20/200 and a myopic error of O.D., −1.5D. sph. ⌒ −0.5D. cyl. ax. 165°; O.S., −1.25. sph. ⌒ −0.5D. cyl. ax. 15° was discovered. Distant vision was correctible to 20/20. There was no abnormality of the pupil, iris, anterior chamber, lens, fundus, or intraocular pressure in either eye. For three weeks, the patient had been using moderately large doses of ACTH for relief of a chronic neurologic condition. The only complication attributed to the ACTH therapy was transient pedal edema, relieved by a Diamox-induced diuresis. The ACTH dosage was gradually being reduced. The night before the onset of myopia the patient had an excessively heavy salt intake. Although no edema was present, in the morning he took 250 mg. of Diamox as a prophylactic measure.

Assuming that the myopia was due to an idiosyncrasy to Diamox, we instructed the patient to continue the dosage of ACTH and take no more Diamox. Within 36 hours, the unaided visual acuity had returned to 20/20. Although the patient has used ACTH for the past year, there has been no recurrence of myopia. Diamox has been avoided, and Mercurhydrin has been used in its stead.

In reviewing the literature for like occurrences, we found few descriptions of transient myopia. Duke-Elder[1] states that it may de due to localized ocular changes such as glaucoma, spasm of accommodation, and alterations in the refractive index of ocular media. He lists systemic conditions which can result in myopia, including alkalosis, diarrhea, diabetic acidosis, and sensitivity to arsenicals and sulfonamides.

In the recent medical literature, only three reports of acute myopia were found. Larsen[2] and Stern[3] report its occurrence during therapy with ACTH, and Back[4] describes a case in which a patient had two myopic episodes while taking Diamox. Personal communication from Lederle Laboratories[5] reports several undocumented cases of transient visual blurring during the use of Diamox for unrelated medical conditions.

Approximately six months following the event just described one of our patients was given Cardrase to help control her chronic simple glaucoma. This patient had a prior history of allergy to sulfa drugs. On the second day of therapy with Cardrase she experienced general fatigue and an increase of

myopia from −1.0D. to −1.75D., O.U. This condition disappeared within 24 hours after the last dose of Cardrase.

The structural similarity of Cardrase, Diamox, and the sulfonamides seems to be a common denominator in these two cases. We have not had the temerity to advise a trial of sulfonamides although the result of this trial might further substantiate the relationship. We do not know whether the effect noted was mediated through an enzymatic, allergic, or other mechanism.

Since our experience with these two patients, we have seen two papers by Christiansson[6] and Kronning[7] reporting transient myopia with Diamox.

70 N.E. Second Street.

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LIPID INFILTRATION IN THE RABBIT IRIS*

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James A. Turner, M.D.

and

Donald Kissil, M.S.
Lawrence, Kansas

The relationship of various ocular lesions to disturbance in fat metabolism has been recently reviewed.[1] Although lipid infiltration of the sclera and cornea of the rabbit[2] and human[1] has been reported, similar effects have been unnoticed in the iris. The following note is a report of such a fatty infiltration.

The original purpose of this study was to determine the possibility of an interrelationship between nicotine and cholesterol in the production of experimental atherogenesis. Detailed results are reported elsewhere.[3] The experimental design was based upon the administration of cholesterol (1.0 percent) and cottonseed oil (5.0 percent) in the diet. Nicotine was given in the drinking water of some groups to correspond to the use of various amounts of tobacco. Appropriate controls were used. The treatment was continued for 24 weeks. At the termination of the experiment, because of the obvious ap-

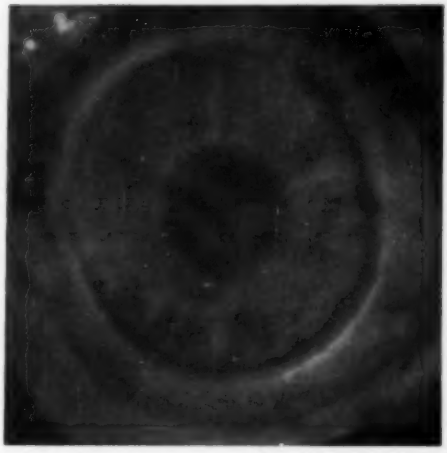

Fig. 1 (Wenzel, Turner and Kissil). Eye of control rabbit showing absence of lipid in iris.

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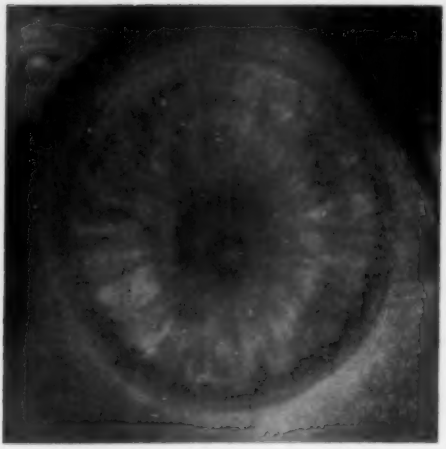

Fig. 2 (Wenzel, Turner and Kissil). Eye of cholesterol-fed rabbit with pupil constricted.

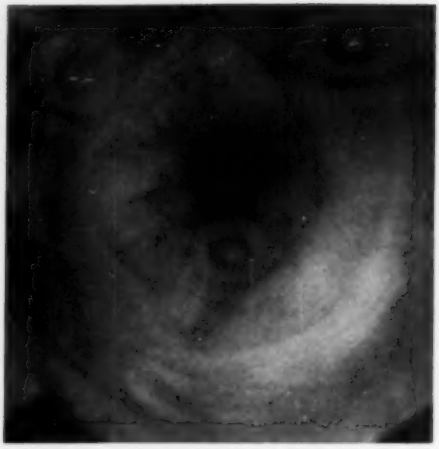

Fig. 4 (Wenzel, Turner and Kissil). Eye of cholesterol-fed rabbit with arcus lipidus.

pearance of the eyes, they were subjected to gross and microscopic study.

Figures 1 to 4 illustrate representative eyes of cholesterol-treated animals. Figure 1 is an eye from a control rabbit with the cornea removed. Figures 2 and 3 are eyes similarly prepared from cholesterol-fed animals with a constricted and a dilated pupil, respectively. The marked quantities of lipid in the iris did not appear to affect the function of that organ and it responded to the usual stimuli. Figure 4 illustrates the arcus lipidus frequently observed. Although the time of onset of the infiltration process was not observed, it was apparently related to the duration of the treatment. It should be noted that there were no obvious differences between the eyes of animals receiving cholesterol alone as a dietary additive and those also receiving nicotine.

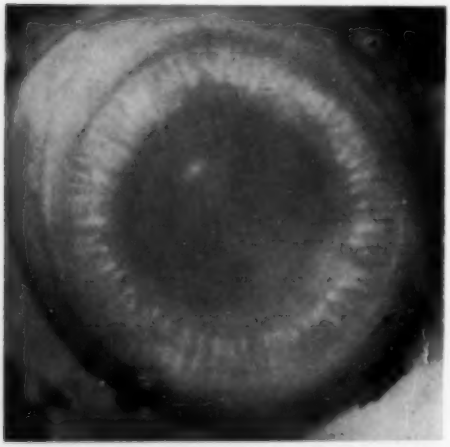

Fig. 3 (Wenzel, Turner and Kissil). Eye of cholesterol-fed rabbit with pupil dilated.

The following description is of a representative eye from an animal of the cholesterol-only group. Gross examination revealed an eye with normal contour and tension. The lipid infiltration was so extensive as to obscure the normal pink color of the iris. The sclera was yellow in color and highly vascularized. Fatty material was distributed in a linear deposition radiating from the pupil through the iris and about the periphery of the iris at the limbus. Sections through the eye revealed this to consist of a soft yellow-gray tissue uniformly distributed throughout the involved layers, including nodules in the sclera posteriorly.

Microscopically, the iris was virtually completely infiltrated with fat-filled macrophages. Similar depositions including large vacuoles of fatty material were found in

the ciliary body. The latter were also observed to a minimal degree beneath the stratified squamous epithelium of the conjunctiva. The major deposition, however, was in the macrophages of the iris and ciliary body. Sections through the posterior sclera revealed the fatty material to be deposited in all layers of the wall.

School of Pharmacy.

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AN EYE CLOSURE SIGN

Related to the visual efficiency of the eyes

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New York

Most persons can close the right eye and the left eye separately keeping the other eye open. Some persons can do it on one side but not on the other; some cannot do it at all. The eyes of persons in the second group are often found to be unequal in visual efficiency and, in most cases, it is the better eye which cannot be closed separately. Some are aware of this inability; many learn about it only when the action is requested.

We can imagine that the co-ordination required by one-sided eye closure is learned early in life. If the eyes are equally good, the eye used may be either—but, if one eye is preferred, the only learned co-ordination may be closure of the less usable eye with opening of the preferred eye. This pattern seems to persist throughout life and seems generally not to be influenced by later changes in visual efficiency.

Five groups of 50 persons each have been examined for this eye closure sign. In the first group there were 50 children, aged six to 16 years, with equally good vision in both eyes (20/20, 20/20 without correction). Three of these children showed some difficulty in closing one of the eyes separately.

In the second group there were 50 children, aged six to 16 years, with one weaker eye (20/50 or less with best correction). Of these children, 29 showed difficulty in closing the better eye separately, while two could not close the weaker eye separately.

In the third group were 50 adults, over 30 years of age, with equally good vision in both eyes (20/20, 20/20 without or with minor correction). In this group only two showed difficulty in closing one of the eyes separately.

In the fourth group of 50 adults aged over 40 years and with reduced vision in one eye (20/50 or less with best correction) due to pathologic changes acquired in adult life, six had difficulty in closing the better eye separately.

The fifth group comprised 50 adults, over 30 years of age, with one eye weak from early childhood (20/50 or less with best correction). In this group 36 had difficulty in closing the better eye separately, while four had difficulty in closing the weaker eye separately.

Difficulty in closing one of the eyes separately suggests that there may be a weakness in the visual function of the other eye, and that this weakness may have been present from early childhood.

229 East 79th Street (21).

SOCIETY PROCEEDINGS

Edited by DONALD J. LYLE, M.D.

NEW YORK SOCIETY FOR CLINICAL OPHTHALMOLOGY

November 3, 1958

SLITLAMP EXAMINATION OF THE VITREOUS AND FUNDUS

DR. MILTON BERLINER described the methods of examination and certain biomicroscopic findings of the deeper and peripheral vitreous. Details of the vitreous structure or framework can only be observed by means of a Tyndall phenomenon and, consequently, only those instruments affording high intensity of illumination are satisfactory. The cornea, aqueous, and lens must be reasonably clear. Owing to the high intensity of illumination, cycloplegics, in addition to mydriatics, are required to keep the pupil maximally dilated (10-percent Neosynephrine and 1.0-percent Cyclogyl) during the examination.

For optical reasons, he prefers Goldmann's contact lenses and reserves the preset-lenses (Hruby or Bayardi) for children, apphrensive patients, and in cases recently operated. Dr. Berliner is partial to Goldmann's contact lenses with the three mirrors. With this contact lens in position and by rotation of the mirrors, the angle of the anterior chamber, posterior pole and periphery of the vitreous and the fundus can readily be examined. The lateral peripheral areas of the fundus offer some difficulty (stereoscopically), but the new Haag-Streit instrument, which can be tilted frontally and with a horizontal beam, may to a degree solve this problem.

He has found that scleral depression in many instances, even with a contact glass in situ, is of great assistance in bringing the periphery into view. With practice, the results obtained by means of the contact lens with three mirrors, not unlike those obtained with the stereoscopic-indirect ophthalmoscope, will be found to be very rewarding.

After discussing the normal trabecular framework and Cloquet's canal, the changes in age and myopia were considered. Senile and myopic central liquefaction (very common) with the formation of a large cavity or "lacuna" often stimulates detachment of the posterior, limiting layer (hyaloid). This change has also been called pseudodetachment of the vitreous. As Goldmann and Favre have indicated, this may proceed and possibly lead to actual detachment and especially collapse of the vitreous. However, the lacunae or cavities of this type must not be confused with the space within Cloquet's canal which, leaving the anterior hyaloid, usually can be traced backward below the lacuna or pseudodetachment.

Detachment of the vitreous is usually either total or partial, with or without collapse. The relationship between vitreous detachment and retinal detachment was discussed. Berliner feels that this subject, especially as regards vitreous traction and its relationship to the formation of the retinal breaks, requires further elucidation.

The formation of the so-called pseudovitreous membranes, unless associated with an exudative process or hemorrhage, is seldom, if ever, seen in the vitreous before an actual, simple, idiopathic retinal separation occurs. It happens afterward.

As one approaches the retina, the Tyndall phenomenon may be interfered with by the red fundal reflex. With the narrow beam, intensity of illumination decreases; hence, one must employ the wide beam.

In the future, greater intensity of illumination than is now available, possibly derived from new light sources, will most surely bring out new details.

Scleral rigidity and tonometry in the aged

Dr. Julius Schneider read a paper by himself, Dr. Morris Feldstein, and Dr. Abraham Kornzweig on a study at a Home for the Aged. Serial tonometries were done on many of the resident patients, using 5.5- and 10-gm. weights. Attempts to correlate the findings with scleral rigidity tables, using both the 1948 and 1955 Schiøtz scales, gave inconsistent findings; many eyes showed high, normal, and low rigidity when tested on different days. However, with the new scale it appears that scleral rigidity does not increase with age.

A conclusion was reached that ordinary tonometer readings are very unreliable and the suggestion is made that, in order to obtain even grossly accurate readings either an electronic tonometer or many repeated measurements with a Schiøtz tonometer should be used.

Repeated testing showed that about 20 percent of the patients had possible or potential cases of glaucoma, and about half of these actaully had glaucoma. Routine rigidity measurements in clinical practice were not believed to be justified.

Aniseikonia

Dr. Arthur Linksz summarized some of the experiences gained in the Aniseikonia Clinic of the Manhattan Eye, Ear and Throat Hospital. Aniseikonia is likely to produce symptoms and might be significant in the following types of cases:

1. Small amounts of anisometropia (up to two diopters difference in the refraction of the two eyes). With a difference of one diopter or less, 25 percent of the cases tested showed significant size difference (all were patients suffering from unrelieved eyestrain). There were among them a few cases with no refractive difference whatever, even cases with bilateral emmetropia. With a difference of 1.0 to 2.0 diopters a significant image size difference was found in 50 percent of the cases. Difference of over 2.0 diopters usually means poor or noncompulsive binocular vision and therefore less likelihood of symptoms due to aniseikonia.

2. Cases with visual symptoms following successful retinal detachment surgery.

3. Unilateral aphakia corrected with a contact lens in one or both eyes (very rarely).

4. Cases one could label "acute aniseikonia due to astigmatism caused by a healing corneal wound."

5. Cases in which a sudden change of retinal image shape or size has been caused by putting in or leaving out a cylinder correction or by change of base curves in a new pair of spectacles. These are often corrected by time or correctible by adjusting the prescription, without using special size lenses.

On the other hand testing for aniseikonia is usually of no value in the following types of cases:

1. Anisometropia of considerable degree and/or noncompulsive binocular vision, as in unilateral aphakia.

2. Metamorphopsia, for example due to central serous retinopathy.

3. Reading difficulties.

Alan H. Barnert,
Recording Secretary.

CHICAGO OPHTHALMOLOGICAL SOCIETY

December 15, 1958

Dr. J. Vernal Cassady, *President*

Modern therapy of uveitis

Dr. Dan M. Gordon (New York) opened by stating "it is an unfortunate fact that the etiology of uveitis is discovered frequently in the literature and rarely in the patient." The patient with uveitis is usually put through a series of elaborate and expensive tests and frequently therapy is withheld

while the eye continues to be damaged. He then made a plea for immediate corticosteroid therapy in practically every case of uveitis unless strong contraindications are present. This is especially true for patients with macular lesions. Dr. Gordon then reviewed some of the more commonly alleged causes of uveitis, for example, toxoplasmosis, streptococci, tuberculosis, and so forth, and concluded that none of these militate against the use of steroids. He feels that most uveitis is allergic in nature and possibly a vascular reaction to infection elsewhere.

Treatment with steroids varies somewhat with the location and chronicity of the lesion. Anterior uveitis should be treated with local steroid suspensions or solutions every half hour. Cycloplegics should be used as long as there are any synechias present. In most cases systemic steroids are desirable as an adjuvant therapy. Initial doses should be 80 to 120 units of the long-acting corticotropins or equivalent amounts of the oral corticosteroids. This is usually about six tablets a day. If steroid therapy is maintained for longer than two weeks the dose should be tapered off by decrements of one tablet per day.

Posterior uveitis must be treated even more rigorously and a dose of 120-160 u. ACTH is given intramuscularly immediately, followed by oral steroids at a level of eight tablets a day. This dose is reduced as the disease subsides as indicated by improvement in vision, "hardening" of the lesions and decrease in aqueous flare and vitreous haze. Similar therapy is indicated for recurrent uveitis, chronic uveitis and sympathetic ophthalmia. In every case a high initial dose should be employed and this continued for as long as necessary.

Complications such as water retention and glaucoma are best treated with the carbonic anhydrase inhibitors. Surgery, when required, should be undertaken and the patient protected by large doses of steroids before, during and after the surgery.

Discussion. Dr. John Bellows: I wish to congratulate Dr. Gordon on an excellent presentation on a very important subject. Also, I commend Dr. Gordon on his courage in forging a new pathway and leaving some of the older methods and forming some new methods.

We must agree with him that immediate therapy is essential. In an acute case of uveitis that is rapidly progressive, the reason for that is obvious. The size of lesion, as found in the eye, would be of very little importance in parts of the body other than the eye because of the necessity of the clarity of media. The exudate or products in cellular debris from an inflammatory lesion can cause a great deal of irretrievable damage. So, immediate corticosteroid therapy is essential in acute progressive uveitis.

When it comes to the chronic types of uveitis, there we can pause and reflect for a moment. Dr. Gordon hasn't had time to cover all the topics he had in his paper and I may mention the fact that, in the anterior types of uveitis with the low-grade type of cells frequently found accidently in a routine type of examination, the complication of cellular debris and exudate on the anterior and posterior surface of the lens capsule will produce a cortical cataract very similar to that seen in senile cataract except for the appearance and deposit of cells.

Whereas the posterior type of uveitis of a low-grade intensity will produce an opacity on the posterior surface of the cortex of the lens with a polychromatic appearance, with a tendency for the opacity to elongate axially and to prolong itself along the posterior adult suture system.

Dr. Gordon stresses the need for gradual reduction in the use of corticosteroids. This should be re-emphasized. If the patient has been treated for over two weeks it is necessary to reduce the amounts of corticosteroids gradually. It has been shown by chemical means that corticosteroids are highest in the urine and blood in the morning. So, the first reduction should be made in the morning medication. That could be omitted first and

the first tablet may be given at noon. Gradual redutcions should be continued as shown by Dr. Gordon.

But one point must be emphasized. The patient should be warned or his physician should be warned that at any time of stress, such as acute infectious disease or the need for surgical treatment, the corticosteroid should be reinstituted and used throughout the period of stress. That applies for at least one year after cessation of treatment with corticosteroids. Hypocorticalism may exist for as long as one year.

DR. MAURICE PEARLMAN: I certainly agree with the main theme of Dr. Gordon's paper that our understanding of uveitis is dark and medieval, that almost all of our uveitis surveys are getting us nowhere. And until our ignorance as to specific etiologies is dispelled, we should exploit the nonspecific biologic fire extinguishers in corticosteroids fully and adequately.

I also agree that such treatment should be given promptly when permanent damage is threatened without waiting for academic laboratory studies. On some specific details however, I would like to voice some different opinions:

As to whether we should lessen or abandon the use of our uveitis survey studies, I believe that, until a better approach is invented, we must continue them and, in fact, expand them in a concerted program in the major eye centers, as the National Institute of Health now proposes to do, utilizing the newer techniques of immunology, virology, ultramicroscopy, and so forth. But, in the meantime we private practitioners will probably continue our usual futile conventional studies.

As to the use of other nonspecific measures, I personally subscribe to the idea that physical and emotional stress indirectly precipitates or aggravates uveitis and that they should be relieved whenever possible. Also, fever therapy should be kept in our armamentarium for I believe I have seen it successfully used after steroids have failed. Salicylates also have value. Rheumatologists consider them to have steroidlike action and this property may, therefore, be useful in protracted cases when steroids must be reduced or withheld.

As to not using cycloplegics I think Dr. Gordon is guilty of abandoning a good old friend and to me it is almost pure heresy. But I personally feel that cycloplegic plus steroids is better than either alone.

As to the safety of corticosteroids, despite the fact that the synthetic newer steroids are safer and have less tendency to produce side-effects, I disagree with the wisdom of not sharing the responsibility of prolonged intensive therapy with an internist. Gastrointestinal hemorrhage and psychosis may not give adequate advance warning and also, I doubt and question the idea that steroid water-retention can be managed by simple wringing out the kidneys with diuretics.

In your paper you made reference to a very good remedy of using a 2-2-2 injection to force dilation of the pupil. That is, using two minims of one-percent atropine, two minims of 1/1000 adrenalin and two minims of four-percent cocaine in a little cocktail to help dilate the pupil. Several years ago at our clinics we developed a fear that these ingredients exceeded the safe limits and, therefore, we withheld it. But, prompted by this paper, I rechecked the figures and found that this concentration is really safe. Atropine in this mixture will add up to 1.0 mg. of atropine which is considered by some standard toxicology texts to be the limits of safe injectibility. Epinephrine is also safe, in that this mixture would add up to 0.14 mg. and the toxic limit is 0.5 mg. Cocaine adds up to 6.0 mg., whereas the toxic limit is 30 to 50 mg.

I would like now to address the following questions to Dr. Gordon:

1. What sort of uveitis survey do you conduct?

2. What considerations do you give to granulomatous and nongranulomatous types of uveitis in your management?

3. How do you manage uveitis with tuberculosis and toxoplasmosis?

4. Is retrobulbar cortisone useful?

5. What objective criteria do you have in your steroid therapy? I think perhaps you can summarize that for us.

I close by thanking Dr. Gordon for sharing his experiences with us and confessing that because of his arguments and case presentations, and despite my reservations, I will probably be more liberal with steroid therapy in the future.

Dr. Dan M. Gordon: I will try to answer some of the questions asked in a random order. As to choice of steroids, most patients will respond equally well to any systemic steroids. Some, as I indicated, will not and you have to find out which one they will do well on. If they don't do well on one, you cannot assume that all steroid therapy will fail. The newest one we have of course is Decardron® which has the highest anti-inflammatory potency per mg., without at the same time any increase in side-effects produced and so far as I know, has added no new side-effects of its own.

The most potent thing that we have and which you'll have to use routinely in every macular lesion, especially if it is the patients' only eye, is ACTH. If I get a patient with a macular lesion, 120 units of ACTH are given in the office, then he is hospitalized and put on 25 units intravenously.

As to uveitis surveys, I don't believe that surveys are indicated in acute uveitis but if you want to do them go ahead. I am in a rather fortunate or unfortunate position. The chronic cases that I get are not mine originally. They have all been worked up and nobody has ever found much, if anything. Nothing covers most of them. There is a good probability that a lot of these, and Dr. Cassady I know believes this way, are due to toxoplasmosis but we don't, at this point, have any specific treatment for that. Daraprim makes them sick. The last one that I had responded beautifully to corticosteroids and when I gave her Daraprim she became very ill. The doses which have been recommended in the past are usually useless. The NIH is now recommending 200 mg. the first day and either 50 or 75 the next day and then 50 thereafter, plus the sulfonamides.

Tuberculosis is a big field and I am going to have to discuss it briefly from the viewpoint of pulmonary tuberculosis. First of all, I don't think it is very important in the human population as a cause of ocular disease. If it is, it should have flared up in a lot of my patients. Secondly, in the lungs (and I presume that the eye acts the same way) you get an allergic reaction to the tubercle bacillus. It causes a tremendous inflammation, blocks the blood vessels and prevents access of the antimicrobials to the disease. As a result of which there is cavity formation, and so forth. That is one part of the picture. If these people are seen immediately during the acute phase, one gives them intensive corticosteroid therapy plus antibiotics; this inhibits the inflammation and makes access of the drug to the tubercle bacillus easier.

Melanoma of choroid misdiagnosed as metastatic tumor

Dr. Warren Binion discussed the case of a 75-year-old white man who had had a transurethral resection of his prostate and orchiectomy for adenocarcinoma of the prostate in early 1957.

In June, 1958, ophthalmoscopic examination for failing vision revealed a mass in the inferior nasal quadrant of the right eye. An aspirate of the anterior chamber revealed no tumor cells. The general consensus was that this was a metastatic tumor. However, the sharp circumscription of the mass, lack of pain, and unilaterality cast some doubt as to the diagnosis and the eye was consequently enucleated.

Histologic examination revealed a malignant melanoma, predominantly of the spindle cell-B type with occasional epithelioid cells.

Alpha-chymotrypsin in cataract extraction

Dr. George Wyman presented a movie illustrating the use of alpha-chymotrypsin to facilitate cataract extraction. He also reviewed 47 cases in which he had used this material. He stated that, theoretically, the use of this preparation has several advantages over mechanical zonulolysis. There should be fewer ruptured capsules, less loss of vitreous, and fewer retinal detachments due to excessive traction and pressure. In only one or two cases did he find it necessary to use any counter pressure. Capsule ruptures occurred in two cases—one when the patient made a sudden head movement and the other in an intumescent lens. Vitreous loss was not encountered although in a number of cases the anterior chamber formed rapidly after extraction. He did not feel that this was due to action of the enzyme on the hyaloid but rather that it may be due to too rapid delivery of the lens where there was an attachment between the lens and the hyaloid. It is possible by the use of this agent to extract the lens after grasping it in 10 seconds or less but a more deliberate delivery is probably safer. He observed no evidence of injury to the cornea, iris, or hyaloid. One of the cases unfortunately developed a bullous keratitis due to vitreous attachment to the cornea. Actually, striate keratitis is much less evident in these cases because the cornea is not insulted by pressure or contact by instruments with the endothelial surface. The eyes show not a bit more injection or reaction than without it.

It is recommended that the solution be irrigated out with saline. Dr. Hubata of Armour & Co. states that the enzyme is active probably for several hours in solution. At times, with the lens presenting, it is difficult to flush out the posterior chamber adequately.

The technique shown was to irrigate into the posterior chamber through the iridectomy opening and below at the 6-o'clock position. After several minutes, if the lens does not appear to have risen up, irrigation is repeated, followed by the saline irrigation.

Dr. Wyman discussed what might happen in a case of fluid vitreous. He said, "I think the lens might well sink back since it is completely loosened. In one case I have had a shrunken lens which sank down about one third of the way and the vitreous presented above it. Fortunately, I could grasp it and no vitreous was lost."

Of the 47 cases, 25 have had the final refraction. Of these all but seven had a corrected visual acuity of 20/30 or better. Of the seven cases, three were due to diabetic retinopathy. One case was a macular degeneration (known beforehand). One case was an amblyopic eye which did get 20/70 and one case had bilateral lens extractions with 20/20 in one eye and only 20/60-2 in the other, with vitreous presenting into the anterior chamber.

There were two cases with definite loss of the anterior chamber. In three other cases there was a narrowing for a day or two during the first few weeks. No surgical intervention was necessary in any of the cases.

There were three cases of glaucoma. One of them was due to pupillary block syndrome and after several operative procedures was normalized but requires miotics to control. One case on subsequent checks showed a rise in tension, in the unoperated eye also, so it must have been a pre-existing glaucoma, though the pressure was within normal limits when first examined. In the third case the tension went up to 34 mm. Hg and has been readily controlled by DFP. Other complications encountered were one case of a filtering cicatrix and another case where the wound edges were poorly coapted at two weeks, but subsequently healed solidly. Several hyphemas were seen but they were not extensive and were readily absorbed.

The youngest cases done were in patients 37 years of age—one a bilateral case, the other monocular. The lens appears to be

loosened just as effectively in these patients as in those aged 80 years.

Discussion. DR. DAVID SHOCH: Dr. Wyman's film illustrates that he is a careful operator whether or not he uses alpha-chymotrypsin to facilitate extraction of the lens. Let me first state that I think the use of this enzyme is a great advance in the surgery of cataract. However, in our haste to adopt this new material we must not neglect what has been a very satisfactory operative procedure up to this time. A large series of statistics from all quarters of the globe has shown that eight out of 10 cases of ordinary senile cataract patients may expect a good visual result after the routine extraction. By this I refer to postoperative vision of 20/30 or better. I think it is quite obvious that cataracts in the younger individual present a special problem and I will discuss this further shortly. As regards the routine use of alpha-chymotrypsin in the elderly patient, I feel that many of the advantages claimed for the enzyme are illusory rather than real. I fail to see how the use of this enzyme will reduce the incidence of iritis, since in every operation the iris is grasped and cut. By definition a traumatic iritis must result. Further, it is claimed for this material that it will reduce the incidence of retinal detachment after cataract extraction. It has never been satisfactorily shown that the traction on the zonule fibers is responsible for postoperative detachments and the numerous detachments that occur in phakic persons would seem to belie this conclusion.

A third claim made is that it will reduce the incidence of unintentional extracapsular extractions. This may well be true but this factor can only be evaluated after a larger series of cases is reported. In our own hospital we now have a series of 16 cataract extractions performed with this enzyme. The only serious complication that has resulted is a vitreous adhesion to the cornea in two of them. However, this is a most annoying complication because of the graying of the cornea. It perhaps may not be fair to ascribe this complicatiion to the use of the enzyme since, as Dr. Wyman mentioned, it has occurred in cases done without the use of alpha-chymotrypsin.

On the positive side of the picture I have recently performed a cataract extraction in the second eye of a 52-year-old man, using the enzyme. The extraction was completely uneventful. His first eye was done two months ago and it was almost impossible to rupture the zonule and there was an attendant loss of vitreous and a stormy postoperative course. Certainly this patient has benefited greatly from the use of alpha-chymotrypsin.

One final claim made for the material is that it will enable congenital cataracts in children to be removed intracapsularly. Those of you who saw Dr. Troutman's film at the Academy meeting will recall the severe loss of vitreous that occurred in a three-year-old child. Certainly up to the age of 14 or 15 years definite vitreous attachments to the lens are present. At this time experiments in our laboratory show that alpha-chymotrypsin does not dissolve these lenticulo-hyaloid attachments. Therefore, attempted intracapsular extraction can only be disastrous. The field of greatest usefulness for this material appears to be in the young adult between the ages of perhaps 25 and 45 years. It also has some advantages for the extraction of the routine senile cataract but these advantages are not, as yet, clear-cut and, until further data have been correlated, I feel a little caution should be exercised in the use of this most potent material.

David Shoch,
Recording Secretary.

AMERICAN JOURNAL OF OPHTHALMOLOGY

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1959 OXFORD CONGRESS

The XLIVth annual meeting of the Oxford Ophthalmological Congress was the celebration of its Jubilee. It will be recalled that the late Robert W. Doyne, to whom ophthalmology owes so much, founded the Congress in 1909 and, since then, except for intervals due to wars, the annual meeting has been an event of increasing importance to ophthalmologists everywhere.

It was most appropriate, therefore, that the Congress began on Wednesday, July 1, 1959, with an impressive and moving service held in the historic and beautiful university church of St. Mary's, High Street. It was conducted by the Vicar, Dr. Roy Lee, whose inspiring address was most timely. The Lesson (John: 9: 1-34) beginning "And as Jesus passed by, he saw a man which was blind from his birth. And his disciples asked him, saying, Master, who did sin, this man, or his parents, that he was

born blind? Jesus answered, neither hath this man sinned, nor his parents, but that the works of God should be made manifest in him," etc., was read by the master of the Congress, O. M. Duthie of Manchester. Prayers for the Blind, for the Spiritually Blind, and for all hospitals and those who minister to the sick and disabled were read. Hymns 185 and 10 were sung.

Following the church services, the opening ceremony of the Congress took place in the historic Hall of Balliol College, with the formal installation of the new Master, O. M. Duthie, whose gracious address paid homage and gratitude to Mr. Doyne. Greetings from ophthalmological societies from many parts of the world were given by their representatives. After a group photograph as a record of this historic occasion, and an informal luncheon in Balliol College, the scientific program opened with a discussion on "Ophthalmic manifestations in pediatric practice," initiated by Mr. A. B. Nutt (Sheffield) and Prof. R. S. Illingworth, also of Sheffield. It was most remarkable that so much important information could be presented adequately in a relatively short time. These papers, when printed in the *Transactions* of the Ophthalmological Society of the United Kingdom, as is customary, will repay careful study. Discussion of these papers was continued by Mr. Peter Wilson (Huddersfield), Mr. Joseph Minton (London), Dr. W. O. G. Taylor (Ayr), and others.

The 1959 Nettleship Award of the Ophthalmological Society of the United Kingdom was presented by the Master, as representative of the Society, to Mr. T. Keith Lyle of London, an obviously popular and suitable recipient.

The first day's meeting closed with a continuation of last year's interesting innovation of "Any questions?" There was time for 11 questions, mostly regarding ophthalmic therapeutics and answers by various members of the Congress from the floor. This is a most attractive feature and worthy of further development. It is a sort of round-table discussion, with which we in the United States are familiar.

A beautiful garden tea party was then held in the enclosure in front of the Hall of Balliol. The weather had cleared and warm sunshine flooded the unforgettable scene. The Governors of the Oxford Eye Hospital, which was founded by Robert Doyne in 1886, later gave an elaborate cocktail party.

On Thursday, July 2nd, the Congress opened with a contribution by Dr. Edmund Spaeth of Philadelphia on "Complications from cataract surgery in the myope." Spaeth found that the incidence of retinal detachment following cataract surgery was no higher in the myope than in the nonmyope. This finding was confirmed by Joaquin Barraquer of Barcelona, and others in their discussions.

Mr. H. B. Stallard of London gave a remarkable paper, entailing an enormous amount of careful work, on "Irradiation of malignant melanoma of the choroid." He showed conclusively that melanomas are not radioresistant, as is so widely believed, and that the prognosis for some useful vision after the treatment of intraocular melanoma with radioactive applicators is best in those cases in which the neoplasm has not penetrated Bruch's membrane. Thirty-six cases in a total of 46 patients were successes. This paper will surely be an important landmark in ophthalmology.

Dr. Joaquin Barraquer then reported on 411 cases of his "Results obtained by the inclusion of plastic lenses in the anterior chamber after five years." His experience concerned the use of the rigid and elastic types of such lenses, and his results allowed him to confirm the good tolerance and utility of this procedure. He mentioned and discussed in detail the rather infrequent complications that he encountered and pointed out that these complications in his opinion were due to an erroneous indication, a badly constructed lens, or a deficient surgical technique. A lively discussion ensued. The conservative views were emphatic.

Mr. Barrie R. Jones of London gave a paper on "The management of ocular herpes." His remarks were provocative of thought and brought to us some new approaches to the care of these painful and disabling and disfiguring diseases.

Mr. A. G. Leigh of London discussed "Therapeutic corneal grafting." His wide experience and authority in this field commands our attention and respect and should stimulate us to make broader use of corneal grafts, for a host of ocular conditions may be obviously benefited by such therapy.

For the afternoons, various tours and sight-seeing trips were planned as a Jubilee celebration and were enjoyed by all members and guests. Your correspondent and his wife enjoyed the Henley Regatta as guests of a famous old Cambridge Oar who is now an eminent ophthalmologist, Mr. Frank Law, and had the pleasure of seeing two excellent Harvard crews, which later won the grand challenge and Thames cups, win their events of the day most easily.

In the early evening, the lady members of the Congress entertained us all with a cocktail party in the lovely gardens of Holywell Manor. Later the old "Doyners" and their wives had the pleasure of dining at the ancient and historic Bear Hotel, Woodstock, as guests of the Master and Council.

Friday, July 3rd, was the Doyne Memorial Day. On this occasion, a most happy thought, each of the previous Doyne lecturers who was able to be present, gave a short discussion on "After thoughts" of the subject of his lecture. The lecturers present were Dr. Thomas Henderson (1926), Mr. F. A. Williamson-Noble (1939), Prof. Sir Wilfred le Gros Clark (1942), Prof. Sir Geoffrey Jefferson (1945), Prof. L. S. Stansfield Stone (1947), Sir Stewart Duke-Elder (1948), Prof. Hans Goldmann (1949), Mr. John Foster (1951), Dr. Dorothy Campbell (1952), Mr. T. Keith Lyle (1953), Mr. Frederick Ridley (1954), Sir Tudor-Thomas (1955), Prof. Robert Platt (1956), Dr. Derrick Vail (1957), and Mr. O. Gayer Morgan (1958). Communications by letter were received from Miss Ida Mann (1929), Prof. Josef Meller (1934), and Mr. Burdon Cooper, a founder, (1922).

It was a most interesting and successful session, as you can imagine, because of the changes and, in many instances, the progress in our knowledge concerning the wide spectrum of the subjects covered since the individual lectures had been given. The 1960 Doyne Lecturer and Medalist will be Prof. Norman Ashton of London.

That evening the Jubilee dinner was formally held in the ancient, high-vaulted Hall of Balliol. A marquee had been set up in the adjoining campus to take care of the generous overflow. It was a glittering, impressive and entirely delightful affair, with witty speeches, excellent foods and wines. Mr. F. A. Williamson-Noble proposed the Toast to the Oxford Ophthalmological Congress, to which the Master skilfully responded. The Toast of the Guests was given by Sir Tudor-Thomas, the immediate Past Master, and responded to by Sir David Lindsay Keir, Master of Balliol, and topped by a witty and humorous speech by Mr. John Foster.

The concluding morning session of July 4th consisted of contributions by Dr. C. D. Binkhorst of Terneuzen, Holland, on "Iris-supported artificial pseudophakia: A new development in intraocular artificial lens surgery (iris clip lens)." This bold and ingenious device came in for considerable conservative criticism. Mr. Harold Ridley of London described and demonstrated his "Flying spot electronic ophthalmoscope." The size and clarity of the television picture of a subject's fundus was most remarkable and the demonstration justly received prolonged applause.

Mr. J. E. H. Cogan of Tunbridge Wells read a paper on "An analysis of more than 300 successive intracapsular extractions by phakoresis, alpha-chymotrypsin being used in 50 percent of cases." His results as given were very good and he is an obvious enthusiast for the use of A.C.T. Joaquin Barra-

quer followed with an impressive discussion, modestly detailing his experience with the enzyme, the zonulolytic effect of which, as we all know, was discovered and announced by him in 1958. His results, too, in 290 cases, were uniformly good. He mentioned several cases of edema of the conjunctival flap which he thought were due to A.C.T. He did not think that the incidence of striate keratitis was any greater in his series than before A.C.T. was used. He emphasized that the use of the enzyme in children under 10 years of age lead to disastrous results. Alan Stanworth then reported a comparative, double-blind study of the effects of the enzyme in cataract surgery, and, as a result, he is fairly convinced that the incidence of striate keratitis is greater when the enzyme is used. Other discussers, including Duke-Elder, were, for the most part, conservative in their remarks and advised caution in the use of this substance until much more is known of its effects.

Mr. L. Lurie of London showed an excellent film on "A simple method of cataract extraction with the aid of alpha-chymotrypsin." Essentially, this method consists of expressing the lens, dislocated by A.C.T., as a "slider" by application of external pressure. (I approve heartily of this method, particularly the expression of the lens as a tumbler, using the Smith technique. There is thus no danger of injuring the corneal endothelium by the introduction of an instrument into the anterior chamber. The incidence of striate keratitis is thus reduced to a minimum.)

Mr. L. B. Hartley of Camberley discussed "The treatment of intraocular conditions with T.A.B. protein shock." His plea for the resurrection of the use of intravenous typhoid vaccine as a therapeutic agent was acclaimed by the members.

The final paper of the Congress by Prof. Horst Muller of Frankfort, West Germany, was, in my opinion, one of the best of the meeting. His subject was "Expulsive hemorrhage." His histologic study of 11 cases and his experimental work in rabbits were impressive. His slides were superb.

The registration numbered 280 members, most of whom were, naturally, from the British Isles. However, there were other members present from 14 different countries, some from as far away as India and Iraq. The number of registrants is increasing rapidly each year, as the fame and international character of the Congress spreads. The problem of how to keep the Congress from becoming unwieldy is thus becoming more acute.

The commercial exhibition held in a marquee behind the School of Physiology, where the scientific sessions of the Congress took place, was always crowded. New instruments and devices that made your mouth water were on display.

In a hall adjacent to the auditorium, an exhibition of the historical original works of Mr. Robert Doyne could be viewed. Among other interesting items, such as photographs of the members of the very early Congresses, were the original Doyne case books; the paintings of honeycomb choroiditis, and genealogies of congenital cataract patients associated with Doyne's name.

The gracious and eloquent Master, Mr. Duthie, and the members of the Council are to be heartily congratulated for putting on a most successful, delightful and happy Congress. Those of us who were fortunate in being present will long remember this historic occasion with pleasure and gratitude.

Derrick Vail.

CORRESPONDENCE

What to do when you meet a blind person

Editor
American Journal of Ophthalmology:

Perhaps the readers of The Journal would be interested in the following suggestions on "What to do when you meet a blind person," which originally appeared in the

Good Housekeeping Magazine and was reprinted in the Parents of the Blind, Inc., Chicago, newsletter, *The Lookout:*

All too often, people feel unnecessarily awkward when they meet a blind man, woman or child. The American Foundation for the Blind gives out a few pointers which may help overcome this awkwardness. Many of the pointers are applicable in our own homes and some may be of help to our friends and acquaintances.

1. When you walk with a blind person or guide him across the street, it is easier for him to take your arm. (Taking his arm and propelling him forward may confuse him.) When he takes your arm he will walk just slightly behind you and thus will be able to tell when you are coming to a stop or stepping up for a curb. Blind people usually come to know the width of certain streets, so unless there is an unusual obstacle, you needn't say when the curb is approaching or how far away it is, unless you are asked.

2. When giving directions to a blind person, be absolutely sure of your use of right and left. He depends upon it far more than a sighted person does.

3. If a blind person is using a guide dog, remember that the dog is working and must not be diverted from his important job. Petting the dog and offering him food may distract him.

4. When you meet a blind person escorted by a guide, speak to him directly, not through the guide. His loss of sight has not made him unable to grasp what you are saying. And don't shout! He's blind, not deaf.

5. It is not necessary to avoid the subject of blindness—though out of mere courtesy, you need not talk about it excessively. You may, however, use the word "see" as much and as often as you would with a sighted person.

6. In making introductions to a blind man, you may help him by saying, unobtrusively, "To your right is Mr. Jones," and "Next to him is Mr. Smith." These directions will allow the blind person to associate the right voice with the right person. It also helps if the sighted person who is introduced comes forward directly after you speak his name and says something to the blind person or shakes his hand.

7. In shaking hands, a blind person will generally hold out his hand for you to grasp. If he doesn't, don't insist upon grabbing it.

8. If you take a blind person to a party, tell him quietly where things are and introduce him to people normally. But don't force people on him or try to introduce him to everyone at once.

9. When showing a blind person to a chair merely put his hand on the arm or back of it. He'll seat himself.

10. When you enter a room where a blind person is, say something at once to let him know you are there. Identify yourself; don't play guessing games with him.

11. If you live or work with a blind person, keep doors fully open or closed. A half-open door is a blind person's enemy. And if you rearrange furniture, tell him. He depends upon the placement of familiar objects for guidance.

12. If you go to a restaurant with a blind person, read the menu to him. You may locate the food on his plate by the clock technique: Potatoes at three o'clock, beef at twelve o'clock, vegetables at seven o'clock. And you may also ask him if he'd like his meat cut. But, in general, offer no more help than necessary. He can find his own mouth!

13. Before helping a blind person, always ask if he wants help. Many blind people can do things easily for themselves and may resent indiscriminate help. When in doubt, a safe rule to follow is to give the blind man credit for being a normal person and to act accordingly. Common sense and tact are reliable guides.

14. Think twice before giving to blind beggars. Begging by the blind is heartily disapproved of by the great majority of blind people who work or otherwise lead dignified lives. Most blind people feel that any money

given to blind beggars, many of whom already receive pensions or other benefits because of their blindness, could be more advantageously given to organizations dedicated to helping all blind people.

15. Finally, remember that the blind man has lost none of his individual personality through his handicap. He knows he cannot see, and he has probably become used to the fact. He has no sixth sense, but he has learned to use his other senses more sharply to compensate for the loss of one.

(Signed) Bette Yones,
Corresponding Secretary,
Parents of the Blind, Inc.,
Chicago, Illinois.

BOOK REVIEWS

GEOGRAPHIC OPHTHALMOLOGY: ASIA, AUSTRALIA AND AFRICA. Edited by William John Holmes, M.D. Twenty contributors. Springfield, Illinois, Charles C Thomas, 1959. 287 pages, 135 illustrations, index. Price: $8.50.

This is a curious but informative, interesting, and worth-while book of particular importance these days, when the esoteric ocular diseases of tropical countries are apt to be found on our door step due to the air age in which we live. Dr. Holmes, of Hawaii, is frank to admit, however, that no attempt was made to include here all of the major eye diseases that occur in Africa, Asia, and Australia. Such would indeed be a most formidable and perhaps fruitless endeavor. "Instead, the ocular manifestations of a few systemic diseases of regional importance are discussed in detail. Frequent references are made by many authors to the effects of climate, physical environment, nutrition, biochemical, ethnic, cultural, social and other extraneous factors bearing on the etiology and clinical approach of the diseases described." (Editor's preface.)

Alvaro of Brazil opens with a chapter on "The progress of ophthalmology throughout the world: A challenge to leading ophthalmologists." He discusses the teaching of ophthalmology, learned societies, publications, abstracts, and team-work research.

V. K. Chitnis of Bombay has a chapter on "Blindness and the prevention of blindness in India." The problem of blindness on this continent is indeed "of colossal magnitude" as he says. Who has never been in India can have no idea of their herculean task required to solve it. With undaunted and undismayed courage, Dr. Chitnis and his ophthalmologic colleagues, aided by an overburdened and harassed government swamped with crying welfare demands, are determined to go forward in spite of most formidable obstacles, not the least of which are profound ignorance, folklore, religious superstition, quacks, filth, and malnutrition. It rings your heart to read this well-written and rather austere chapter.

Guha of Shillong, India, has a short but effective chapter on malaria; Holmes' chapter on leprosy of the eye is superb; and F. N. Budden of North Nigeria, Africa, describes the natural history of onchocerciasis (a word I can never pronounce), an extraordinary disease suffering at the moment from controversy.

Our old and perennial enemy, trachoma, is discussed in two chapters by Mahmud Ali Shah of Karachi, Pakistan, and particularly its early diagnosis by Das Niran Kari and Chaddah, all of Amritsar, India (site of the beautiful golden temple, and the seat of activities in intracapsular cataract surgery by the late Lt. Col. Henry Smith, I.M.S., formerly of Jullunder). Since the book was in print before the final announcement by Collier (XVIIIth International Congress, September, 1958) of the trachoma virus that fulfills Koch's postulate, this achievement is, naturally, not included in these chapters.

G. de Ocampo of Manila discusses chronic nontrachomatous follicular conjunctivitis, a disease that is highly prevalent in the Philippines, scarcely seen here nowadays. Dr. Agarwal of Agra, India, has a good chapter on phlyctenular ophthalmia, apparently quite prevalent in India, now very rare indeed

here. He also writes on the treatment of corneal ulcers, particularly on the effective role of the various vitamins as adjuncts of value.

Rangachari of Madras, India, writes on xerophthalmia and keratomalacia (the latter the cause of blindness in eight percent of the cases) and gives an unforgettable picture of these conditions in the pitifully malnourished population, especially among the children. Lt. Col. Sayoc, whose name is familiar to readers of THE JOURNAL, describes his simple but effective lid operation of westernizing the oriental eye (see Am. J. Ophth., **38**:466, 1954; **41**:1040, 1956). The search for beauty and seductiveness in the female is universal and instinctively present regardless of pain, inconvenience, or the falling of bombs. It is entirely possible that some time in the future our women here will want to have their eyes "orientalized," a new field for future plastic surgeons.

Law and Gibson of Australia talk about pterygium and favor the Evans' operation which they describe in detail. Minty, radiotherapist of Melbourne, has an excellent chapter on radiotherapy of pterygium and says that the "best results were found to follow a policy of simple excision of the lesion prior to irradiation."

Sato of Japan then most lucidly describes his well-known operation on the posterior cornea and anterior chamber. De Ocampo has a second contribution on penetrating keratoplasty, detailing his experiences with this operation in the Philippines where the need for such surgery is manifest. R. Ching of Hong Kong writes on cataract surgery as an office procedure, which will startle you but make you think.

Nirankari and Maudgal (Amritsar) devote eight pages to a discussion of the Smith Indian cataract operation and describe a modification originally initiated by Smith himself (the bimanual maneuver). Das Nirankari and Chaddah have a second chapter on solar chorioretinal burns, a prevalent condition in India where the sun is worshipped fervently. It is a good chapter.

The book concludes with a paper of 10 pages on orbital rodent ulcers by P. B. English of Australia, who, perhaps, has seen more cases of basal cell carcinoma than anyone in the world.

It is difficult to sum up my impressions of this book. Some parts of it are excellent: other parts seem to be redundant and give us little that is new. The difficulties of being an editor for such a conglomerate work must have been very great indeed, and on the whole, Dr. Holmes has done a good job of it.

Perhaps the lasting impression is that we are all brothers (patient or doctor). We have compassion, sympathy, and respect for each and every one of our group who are dedicated fighters against blindness, wherever there is a sun or moon, tides or stars, death and taxes.

Derrick Vail.

THE TREATMENT AND PREVENTION OF READING PROBLEMS. By Carl H. Delacato, Ed.D. Springfield, Illinois, Charles C Thomas, 1959. 122 pages, 13 illustrations, bibliography, index. Price: $4.50.

Children of normal intelligence with reading disabilities tend to reversals in reading and writing patterns. Poor reading and spelling result. The connection with crossed dominance has long been noted. The Keystone Tests of Binocular Skill are used to determine the controlling eye in binocular vision. This is not necessarily the dominant eye—the eye with which the person sights. The diagnosis of hand-eye confusion is made when the eye which controls binocular vision is on the side of the body opposite the hand used. The dominant eye is stable but the controlling eye can be shifted by training. Occlusion may be necessary.

Vision, however, is only one phase of the problem. Complete neurologic laterality must be established. The affected child must be taught to be physically one-sided. He should be guided to single-handedness, trained to lead off on the dominant foot, and encouraged in sighting activity such as archery and riflery, using only the dominant eye. No

ambidexterity in either foot or hand is allowed. The child should not be given two-handed toys nor permitted to have double holster gun sets. Having set the neurologic chain reaction, the symptoms of reading retardation gradually disappear and stammering and stuttering also.

Prevention of reading problems begins in infancy. Thumb suckers should always suck the thumb of the subdominant hand. The infant should be placed in the crib with the subdominant side away from the wall. All eating utensils should be placed on the dominant side. The sock, shoe, or mitten should always be placed on the dominant side first. Watching a child dress permits an excellent evaluation of his unilaterality. Records, radio and television should be of the story type. Music lessons should follow, not precede, the establishment of dominance.

This stimulating contribution to the difficult problem of reading retardation will be welcomed by both ophthalmologists and educators.

James E. Lebensohn.

VISION SCREENING FOR ELEMENTARY SCHOOLS. By H. L. Blum, M.D., H. B. Peters, M.A., O.D., and J. W. Bettman, M.D. Berkeley and Los Angeles, University of California Press, 1959. 146 pages, 26 figures, paper-bound. Price: Not listed.

This monograph summarizes a comparative study of several vision-screening methods continued over a three-year period on approximately 1,000 school children in Orinda, California, by an interprofessional group. The children in need of professional attention were identified by the detection of poor visual acuity, significant refractive error, faulty ocular muscle co-ordination, and organic pathology of the eye or visual mechanism. Annual re-examinations disclosed that the nonreferrals were the most stable group; 91 percent did not change. The proportion of referrals increased with age, from 18 percent for age-group of five to seven years to 31 per cent in the 13 to 15 year group. The New York School Vision Tester (a modified Ortho-Rater) performed as well but no better than the Massachusetts Vision Kit. The cost per pupil of the various tests were: Massachusetts Vision Kit, 37 cents; Telebinocular, 43 cents; Modified Clinical Technique, 45 cents; and California State Recommended Procedure, 53 cents. Most over-referrals came from Teacher Observation and the Telebinocular test. The Modified Clinical Technique, conducted by paid optometrists, resulted in few over-referrals and missed only two percent of those needing attention. This test used the projectochart, covertest and retinoscopy. It required no more time than the Massachusetts Vision Kit —less than six minutes per child. Nonreferrals were rechecked annually with the Snellen test. This procedure was considered far superior to other screening methods and in community cost per correct referral was the most economical.

A method that under-refers ignores the long-range consequences of not identifying the child who needs professional attention. Over-referrals have received undue emphasis.

James E. Lebensohn.

TRANSPLANTATION OF TISSUES. (Skin, cornea, fat, nerves, teeth, blood vessels, endocrine glands, organs, peritoneum, and cancer cells.) Edited by Lynden A. Peer, M.D. Baltimore, The Williams and Wilkins Company, 1959, Volume 2. Price: $20.00.

The transplantation of a number of tissues has become an important surgical technique. The text brings together considerable experimental and clinical material. The ophthalmologist will find the sections on cells and tissues and the zoologic laws of transplantation of considerable interest. Ramón Castroviejo discusses transplantation of the cornea in a manner intended more for the general physician than for the ophthalmologist. The chief value of the book appears to be in the extensive bibliography and survey of the background and the techniques current in tissue transplantation.

Frank W. Newell.

ABSTRACT DEPARTMENT

EDITED BY DR. F. HERBERT HAESSLER

Abstracts are classified under the divisions listed below. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is mentioned only in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. Anatomy, embryology, and comparative ophthalmology
2. General pathology, bacteriology, immunology
3. Vegetative physiology, biochemistry, pharmacology, toxicology
4. Physiologic optics, refraction, color vision
5. Diagnosis and therapy
6. Ocular motility
7. Conjunctiva, cornea, sclera
8. Uvea, sympathetic disease, aqueous
9. Glaucoma and ocular tension
10. Crystalline lens
11. Retina and vitreous
12. Optic nerve and chiasm
13. Neuro-ophthalmology
14. Eyeball, orbit, sinuses
15. Eyelids, lacrimal apparatus
16. Tumors
17. Injuries
18. Systemic disease and parasites
19. Congenital deformities, heredity
20. Hygiene, sociology, education, and history

1

ANATOMY, EMBRYOLOGY, AND COMPARATIVE OPHTHALMOLOGY

Funder, Wolfgang. **Intravital demonstration of the vortex veins in the experimental animal.** Arch. f. Ophth. **160**:636-640, 1959.

Infiltration of the sclera with glycerin in the region of the vortex veins affords a method of visualizing these veins in their intrascleral portion and, if applied to man, this procedure would help the surgeon avoid them during detachment surgery. (4 figures, 12 references)

Edward U. Murphy.

Garron, L. K., Hogan, M. J., McEwen, W. K., Feeney, M. L. and Esperson, J. **Electron microscopy of ocular tissue.** A.M.A. Arch. Ophth. **61**:647-653, April, 1959.

Electron microscopic photographs of portions of the trabeculae, choroid, iris, and cornea are shown and briefly discussed. (6 figures, 2 references)

William S. Hagler.

Yamashita, T. and Cibis, P. A. **Staining of the retina with saccharated iron oxide.** A.M.A. Arch. Ophth. **61**:698-708, May, 1959.

A new staining technique for the study of the vascular patterns of the retina is described. Saccharated iron oxide injected into the vitreous body in vivo or immediately after death seems to travel towards the optic nerve, and it has an affinity for the acid mucopolysaccharides in the vitreous tissue and perivascular tissue. The staining constituents of the vitreous are sensitive to hyaluronidase, whereas the perviscular tissue staining-constituents resisted hyaluronidase. (14 figures, 16 references)

Irwin E. Gaynon.

2

GENERAL PATHOLOGY, BACTERIOLOGY, IMMUNOLOGY

Cagianut, B. and Theiler, K. **Histology of the ocular changes in macroglobulinemia.** Arch. f. Ophth. **160**:628-635, 1959.

The findings in eight encleated eyes are described. The greatest changes are seen around the disc and macula. The retina is greatly thickened, edematous, and detached in places. (5 figures, 2 tables, 16 references)

Edward U. Murphy.

Hager, G. **Changes of visual functions with the physiological process of aging.** Klin. Monatsbl. f. Augenh. **134**:609-615, 1959.

Central visual acuity, peripheral vision, adaptive mechanisms, color vision, accommodative range, and field of gaze undergo reduction during the process of aging. This is due to changes in the colloidal structure of proteins in the organs involved. (2 figures, 1 table, 25 references)

Gunter K. von Noorden.

Levene, R. Z. **Ocular affects of endotoxin.** A.M.A. Arch. Ophth. **61**:568-577, April, 1959.

The effects of Escherichia coli endotoxin on the normal rabbit eye were investigated. If a dose of approximately 40 times that necessary to obtain a pyrogen effect is given intravenously ocular inflammation will occur. This uveitis results in a breakdown of the blood aqueous barrier which in turn leads to a biphasic alteration in the intraocular pressure. Pretreatment with cortisone completely inhibits these in vivo ocular effects of endotoxin.

The possible role of endotoxin tolerance in the therapeutic efficacy of nonspecific protein therapy is discussed. (9 figures, 44 references)

William S. Hagler.

Schmedtje, John F. **Sympathectomy and immunologically induced bilateral eye reactions in the rabbit.** A.M.A. Arch. Ophth. **61**:453-463, March, 1959.

A severe antigen-antibody reaction in the rabbit eye sensitized by injection of human albumin results from a second intravenous injection of the same protein. A mild reaction may occur in the opposite eye. Sympathectomy of the sensitized eye has no modifying effect on the allergic responses, but if the contralateral eye is denervated, the reaction does not occur in it. The sympathetic denervation of the contralateral eye interrupts the reflex pathways responsible for the contralateral reaction. (7 figures, 30 references)

Irwin E. Gaynon.

Schwab, F. **The antibody content of the cornea after simultaneous introduction of different antigens.** Arch. f. Ophth. **160**: 592-627, 1959.

Serum albumin and serum globulin of the pig and human albumin were the antigens employed in the rabbit. The antibody content of the cornea was four times higher after intracorneal immunization than after intravenous. When a different antigen was injected into each cornea at the same time, only the homologous antibody was found in each cornea, but the blood showed antibodies to both antigens. (9 figures, 1 table, 72 references)

Edward U. Murphy.

Tiburtius, H. and Ehling, U. **Experimental evaluation of cellular therapy in congenital cataract of the rabbit.** Klin. Monatsbl. f. Augenh. **134**:687-692, 1959.

Cellular therapy consists of parenteral application of fetal or juvenile organ cells of animals. The cells can be prepared for injection by using a procedure consisting of dehydration and refrigeration. The value of cellular therapy is a matter of controversy.

The progression of a congenital cataract of the lens sutures in rabbits into cortical and mature cataracts could not be influenced by injection of cell preparations. The injections consisted of dry cell preparations of placenta and lens and were given subconjunctivally to different groups of rabbits during pregnancy, and to groups of young animals. (3 figures, 2 tables, 12 references)

Gunter K. von Noorden.

Van Alphen, G. W. H. M. **Transplantation of the lens.** A.M.A. Arch. Ophth **61**: 115-126, Jan., 1959.

Homologous lens grafts in rabbits may remain clear up to at least 18 months after transplantation. Heterografts turn cloudy in about ten days, accompanied by severe anterior chamber reaction. The clouding of lens heterografts and the delayed clouding of lens homografts are probably best explained by the antigenicity of the proteins and polysaccharides contained in the lens capsule and the changes in its permeability after an immune response from the host.

Band-shaped keratitis and mottling of the cornea can be produced by the presence of foreign lens material in the anterior chamber. (18 figures, 3 tables, 2 references) Irwin E. Gaynon.

Witmer, R. H. **Immunoelectrophoresis of cataractous lenses.** A.M.A. Arch. Ophth. **61**:738-744. May, 1959.

Immunoelectrophoresis of lens protein gives a reliable qualitative estimate of the antigenic components of the human lens that are soluble. The alpha, beta, and gamma crystallin components are organ specific. (11 figures, 17 references)
Irwin E. Gaynon.

Wood, R. M. and Bick, M. W. **The effect of heparin on the ocular tuberculin reaction.** A.M.A. Arch. Ophth. **61**:709-711, May, 1959.

In the animals with tuberculin hypersensitivity, heparin inhibits the inflammatory response to the anterior chamber injection of purified protein derivative. Heparin exerts an anti-inflammatory action when administered systemically or locally. (3 tables, 4 references)
Authors' summary.

3
VEGETATIVE PHYSIOLOGY, BIOCHEMISTRY, PHARMACOLOGY, TOXICOLOGY

Almeida, A. **Observations with the new mydriatic RO-17683.** Rev. bras. oftal. **18**: 63-65, March, 1959.

The author reports his experience with a new mydriatic, produced by Roche Laboratories, which is still in the experimental stage. He found that two drops of the new drug, instilled five minutes apart, give the best cycloplegic action between 10 and 20 minutes after the second instillation and that the cycloplegic effect disappears after two hours.
Walter Mayer.

de Berardinis, E. **Chromatographic analysis of free amino acids of the epithelium of beef cornea and retina.** Ann. d'ocul. **192**:180-190, March, 1959.

The author has determined the free amino acid content of the cornea and retina of beef in two ways; in one the tissues were ground and extracted with trichloracetic acid while in a second group samples were first hydrolyzed and then the amino acids determined. A chromatogram method was used to determine the various free amino acids present. The chromatogram diagrams are given in the article.

He finds that the free amino acid pattern is characteristic for each tissue although it is not necessarily a reflection of the protein bound amino acids in the tissue. In the case of the retina, glutamic acid and alanine were found in higher concentration in the extraction than in the hydrolysates.

The author feels that this has special significance in regard to the part these amino acids play in the metabolism of the retina. David Shoch.

Bleeker, G. M. and Maas, E. H. **Penetration of penethamate, a penicillin ester into the tissues of the eye.** A.M.A. Arch. Ophth. **60**:1013-1020, Dec., 1958.

By experiments on rabbits the authors demonstrated that parenterally administered procaine penicillin penetrates well

into the aqueous but not the vitreous. When used as a penethamate, it also penetrates into the vitreous. (5 tables, 3 figures, 18 references) G. S. Tyner.

Brueckner, R. **Antagonism between visual and vestibular control of ocular and body movements. A movie.** Ophthalmologica **137**:143-146, March, 1959.

The author reports and demonstrates in a movie his observations pertaining to the relationships between spontaneous head and body movements of 1. diurnal birds with highly differentiated foveas and 2. of similar birds blinded by cataract. From these observations the author arrives at the tentative concept that the movements of the head and neck of the blinded bird express principally the guiding influence of the vestibular apparatus which in the normally seeing bird is overshadowed by the optostatic apparatus, that is by impulses originating in the visual sphere and serving the purpose of greater visual efficiency.

Peter C. Kronfeld.

Burian, H. M. and Ziv, B. **Electric response of the phakic and aphakic human eye to stimulation with near ultraviolet.** A.M.A. Arch. Ophth. **61**:347-350, March, 1959.

Phakic patients, nine to 20 years of age, and aphakic patients, responded with slow, protracted, simple positive electroretinograms. No electroretinograms could be obtained from phakic patients 27 years of age or older because of the pigmentation of the crystalline lens. (2 figures, 2 references) Irwin E. Gaynon.

Fleming, T., Merrill, D. and Girard, L. **Studies of the irritating action of methylcellulose.** A.M.A. Arch. Ophth. **61**:565-567, April, 1959.

Various procedures were undertaken to determine if there is any irritating or sensitizing action of 0.5-percent methylcellulose. Tissue-culture studies on human conjunctival and corneal epithelium showed no evidence of inhibition of cellular growth when subjected to a 0.5-percent solution of methylcellulose. Subcutaneous injections in albino rabbits were found to be nonirritative over a 28-day period. Intraocular injections of methylcellulose prepared in a balanced salt solution gave no indication of producing an iridocyclitis, and qualitative tests indicated that the methylcellulose was removed from the anterior chamber by physiologic processes. Solutions of methylcellulose did not produce any evidence of hypersensitivity in guinea pigs. (8 references) William S. Hagler.

François, J. and Rabaey, M. **Agar microelectrophoresis at high tension of soluble lens proteins.** A.M.A. Arch. Ophth. **61**:351-360, March, 1959.

By this technique one is able to determine the mobility of the protein fractions under study in relation to that of human serum albumen. The number of fractions is greater than when studied by paper electrophoresis. Phenograms (electrophoretic diagrams) of the lenticular proteins characteristic of the animal species were studied. The findings for the different species vary as to number and their distribution. (8 tables, 10 figures, 19 references) Irwin E. Gaynon.

Green, H. and Solomon, S. **Hexokinase of rabbit lenses.** A.M.A. Arch. Ophth. **61**: 616-624, April, 1959.

The hexokinase activity in homogenates of young and old rabbit lenses was compared. The total hexokinase activity remained essentially unchanged with advancing age, but the activity per unit weight of lens protein decreased markedly with age. It was found that more than 90 percent of the activity was present in the lens substance and less than 10 percent in the capsule and epithelium. The reduc-

ing sugar in the lens was identified as a ketohexose with the same chromatographic properties as fructose. The significance of these findings is discussed. (17 references) William S. Hagler.

Hill, K., Kinoshata, J. H. and Kuwabara, T. **Experimental aberrant lipogenesis.** A.M.A. Arch. Ophth. 61:361-365, March, 1959.

Oleate-induced lipid formation was studied by means of a radioactive tracer; C^{14} oleate was incorporated into a lipid, which is presumed to be formed by esterification. (2 tables, 1 figure, 9 references) Irwin E. Gaynon.

Jampolsky, A., Tamler, E. and Marg, E. **Artifacts and normal variations in human ocular electromyography.** A.M.A. Arch. Ophth. 61:402-413, March, 1959.

Normal variations in the electromyogram depend on various factors; 1. the site of the needle tip in the muscle: the midbelly gives the greatest reported activity; 2. more than one muscle may be picked up by a single electrode; 3. electrode movements; 4. overlapping of reciprocal innervation of muscles giving differences in time relationship and 5. variation in muscle plane activity.

Artifacts are extraneous recorded potential. They may be due to 1. television, 2. artifacts of base line which may simulate a fast muscle movement 3. orbicularis muscle activity, 4. poor electrode insertion or low amplitude recordings and 5. improper shieldings (heart and swallowing) and inadequate amplification balance.

The recorded electrical unit acivity indicates the contraction, but not the function, of a given muscle at any time. It is erroneous to diagnose binocular muscle functions from monocular electromyograms. (22 figures, 10 references) Irwin E. Gaynon.

Janes, R. G., Alert, H. A. and Hohnson, N. K. **Dependence of aqueous-blood sugar ratios on method of determination.** A.M.A. Arch. Ophth. 61:720-726, May, 1959.

The Nelson-Somogyi, anthrone, glucostat, Hagedorn-Jensen, and Folin-Malmros techniques to determine the sugar content of normal blood, aqueous, and plasma are compared. The Nelson-Somogyi and glucostat techniques appear to be most accurate. (1 figure, 5 tables, 21 references) Irwin E. Gaynon.

Kleinert, Heinz. **The relation between visible aqueous outflow and intraocular pressure after partial emptying of the anterior chamber.** Arch. f. Ophth. 160:473-486, 1959.

A combination of paracentesis and fluorescein injection of the anterior chamber in 39 individuals was used in this study and the time of reappearance of the aqueous vessels and the coincident pressure were noted. In normal subjects the intraocular pressure approximates that of the epibulbar veins but in all types of glaucoma it is higher. (1 figure, 2 tables, 13 references) Edward U. Murphy.

Macri, F. J., Wanko, T. and Grimes, P. A. **The elastic properties of the human eye.** A.M.A. Arch. Ophth. 60:1021-1026, Dec., 1958.

The authors demonstrated on human eyes from an eye bank that the elasticity of the coats increases progressively with elevated intraocular pressure. Eyes became progressively more distensible with duration of time between death and experimental use. (4 figures, 6 references) G. S. Tyner.

Martinez-Roig, H. and Ojers, G. **The effect of prednisolone upon the absorption of hyphema in rabbit eyes.** A.M.A. Arch. Ophth. 61:631-632, April, 1959.

The authors found that systemically administered prednisolone definitely de-

layed the absorption of fresh blood from the anterior chamber of rabbit eyes. In the steroid-treated group the average duration of the hyphema was 31.4 days as compared with an average of 20.3 days in the control group. It is therefore suggested that corticosteroid drugs should be used cautiously whenever blood is present in the anterior chamber from any cause. (1 figure, 1 reference)

William S. Hagler.

Matsuda, T. **Studies of ciliary body.** Acta Soc. Ophth. Japan **63**:155-168, Jan., 1959.

Matsuda examined the ciliary body of living rabbits by inserting a small mirror into the vitreous. When indigocarmine or fluorescein is injected into the carotid, the dyes come out from the ciliary plexus. When the ocular tension is artificially elevated by injecting saline into the vitreous, the immigration of the dyes stops. After a cyclodiathermy the immigration is considerably inhibited. The author further studied the effect of some autonomic agents on the ciliary plexus. Epinephrine causes an anemia of the plexus but later it causes a hyperemia. Atropine causes an anemia of the plexus after an initial hyperemia. Eserine and pilocarpine cause a hyperemia. (5 figures, 3 tables, 25 references)

Yukihiko Matsui.

McLaren, D. S. **Influence of protein deficiency and sex on the development of ocular lesions and survival time of the vitamin A-deficient rat.** Brit. J. Ophth. **43**:234-241, April, 1959.

Protein deficiency does not hasten the onset of xerophthalmia. Where growth is retarded due to protein deficiency, the liver stores of vitamin A are expended less rapidly. Female rats developed xerophthalmia later and lived longer than the males on the same diet. (1 table, 1 figure, 21 references) Irwin E. Gaynon.

Nakano, N. **The influence of Diamox on calcium and inorganic phosphorus concentration in serum and aqueous of rabbits.** Acta Soc. Ophth. Japan **63**:355-367, 580-586, Feb., March, 1959.

When Diamox is given intravenously into rabbits, at the dosage of 30 mg. per kg. of body weight, prior to an intravenous administration of $CaCl_2$, it has little influence on the increase in the concentration of calcium in serum and aqueous. However, when Diamox is given after the administration of $CaCl_2$, a higher level of calcium is maintained in the aqueous. An administration of Diamox into rabbits also causes an increase in the inorganic phosphorus concentration in serum and aqueous. In the aqueous a greater increase results. Nakano believes that this effect of Diamox suggests a role of inorganic phosphorus in the production of the aqueous. (11 figures, 16 tables, 64 references) Yukihiko Mitusi.

Nathaniel, A. and Levene, R. Z. **Mucopolysaccharide sulfate in the cornea and sclera of rabbits.** A.M.A. Arch. Ophth. **61**:641-646, April, 1959.

The uptake and elimination of radioactive sulfate in corneal and scleral tissue buttons of normal adult rabbits was studied. The corneal uptake reached its maximum in 24 hours which compared with 12 hours for the maximal scleral uptake. The turnover of radioactive sulfate in homologous corneal grafts was compared with that of autologous grafts. It was found that the radioactivity of all the tissues associated with the homografts was greater than that of the corresponding tissues of the autografts. (3 figures, 5 references) William S. Hagler.

Orlowski, W. J., Bartosiewicz, W., Michniowska, L. J., Zawisza, W. and Nowakowski, W. **Experimental electrophoretic investigation of proteins of the secondary and inflammatory aqueous in**

rabbits. Klinika Oczna **28**:397-404, 1958.

The authors made a comparative electrophoretic study of rabbit serum and the primary and the secondary aqueous and found about the same quantitative values for each fraction in all three fluids. In inflammatory aqueous, due to bacterial infection in five out of seven rabbits, there was relative increase of albumin and decrease of alpha and gamma globulin. In the remaining two rabbits albumin was decreased. It was also lower in rabbits after X-ray irradiation. Negative results were obtained with the primary aqueous of animals with allergic inflammation and also in all other inflammatory conditions in the period of recovery. (3 tables, 14 references) Sylvan Brandon.

Resar al Attar. **The course of corneal anesthesia of the human eye.** Klin. Monatsbl. f. Augenh. **134**:565-576, 1959.

The analgesic action of cocaine, psicaine, larocaine, pontocaine, and cornecaine was determined with nylon hairs of various diameters and elasticities. The duration of analgesia is mainly dependent on the property of the cornea to recover from the metabolic disturbances introduced by the drug. This recuperation power varies with age. (20 figures, 4 tables, 34 references)

Gunter K. von Noorden.

Schimek, R. A., Balian, J. V., Lepley, F. J. and Ottum, J. A. **Evaluation of dichlorphenamide as an ocular hypotensive agent.** A.M.A. Arch. Ophth. **60**:1053-1060, Dec., 1958.

Experiments concerned with the ocular hypotensive effect of dichlorophenamide and chlorothiazide are reported and compared to that of acetazolamide. The reported results are rather confusing since none of the drugs was really effective unless accompanied by a steroid. (5 tables, 3 graphs, 12 references) G. S. Tyner.

Simonson, E. **Contralateral glare effect on the fusion frequency of flicker.** A.M.A. Arch. Ophth. **60**:995-999, Dec., 1958.

The author carried out flicker fusion experiments on human subjects. The most important result of the studies is the demonstration of a contralateral glare effect involving only the visual pathways. (3 tables, 13 references) G. S. Tyner.

Steinvorth, E. **Paper electrophoretic investigations into the effect of alpha-chymotrypsin on the protein of calf corneal epithelium.** Arch. f. Ophth. **160**:588-591, 1959.

No significant effect was found. (1 figure, 9 references) Edward U. Murphy.

Steinvorth, E. **The electrophoretic reaction of the protein of the calf's corneal epithelium.** Arch. f. Ophth. **160**:540-543, 1959.

A combination of various methods for investigating this reaction by means of paper electrophoresis is described. (4 figures, 5 references) Edward U. Murphy.

Stone, H. H. and Sears, M. L. **Ocular pressure in experimental cross circulation.** A.M.A. Arch. Ophth. **61**:102-109, Jan., 1959.

In rabbits there is a circulatory factor which can bring about a reduction of ocular tension in an undisturbed eye after compression of the other eye. (6 figures, 12 references) Irwin E. Gaynon.

Thomas, C. I., Bovington, M. S., MacIntyre, W. J., Harrington, H. and Storaasli, J. P. **Experimental investigations on uptake of radioactive phosphorus in ocular tumors.** A.M.A. Arch. Ophth. **61**:464-492, March, 1959.

In this study with radioactive phosphorus, comparisons were made between experimental tumors and their application to clinical material. The three phases in this experiment consisted of 1. compari-

son of radioactive phosphorus uptake in bodily tissues and intraocular tissues; 2. the effect of vascularity on the radioactive uptake in neoplastic, inflammatory and normal intraocular tissues; and 3. the correlation of the effects of uptake of radioactive phosphorus on the cellular structure, metabolism, and intracellular distribution. The factors of time, vascularity, tissue geometry and metabolism are of great importance. (27 figures, 5 tables, 48 references) Irwin E. Gaynon.

Ullerich, K. **Experimental inhibition of the thyrotropic and exophthalmic principle of the anterior lobe of the pituitary.** Arch. f. Ophth. **160**:510-525, 1959.

The author discusses previous work with thyroxin, ACTH, estrogens, and paraoxypropiophenon and describes the use of lycopus extract in guinea pigs. A definite inhibitory effect was found. (2 figures, 4 tables, 56 references)
Edward U. Murphy.

4

PHYSIOLOGIC OPTICS, REFRACTION, COLOR VISION

Duane, T., Emrich, R. and Shepler, H. **Lens system designed for water-to-air vision in the submerged human eye.** A.M.A. Arch. Ophth. **61**:561-564, April, 1959.

The authors calculated and designed a plus 64.5 D. (in air) lens system which permits the submerged human eye placed 7.5 cm. from a clear window to see into air with an acuity of 20/20 for distance and 14/14 for near vision. This lens system consisted of a combination of a plus 12 D. planoconvex lens mounted in a standard spectacle frame with a superimposed movable smaller biconvex plus 52 D. lens. With this lens system the field of vision is approximately 20 degrees. (4 figures, 1 reference) William S. Hagler.

François, J., Verriest, G. and Renard, G. **Typical congenital achromatopsia and its clinical diagnosis.** Arch. d'opht. **19**:245-256, April-May, 1959.

Two cases of typical congenital achromatopsia in sisters are reported in detail. The authors stress the essential elements of the clinical diagnosis: photophobia, bilateral amblyopia, nystagmus, and color interpretation as black against a dark red background. They note the existence also of a group of cases of atypical congenital achromatopsia lying intermediate between the typical cases and those of the typical dichromatic systems (protanopsia, deuteranopsia, tritanopsia). They suggest that these atypical cases can be classified in eight categories, as described by François and Verriest in 1958. (7 figures, 2 references) P. Thygeson.

Gramberg-Danielsen, B. **Double innervation of the macula.** Arch. f. Ophth. **160**: 534-539, 1959.

The so-called sparing of the macula seen in visual fields is not limited to the macular region but the same phenomenon may be noted all along the border of the nasal and temporal fields. It is caused by mixing of the nerve fibers from the border area. (35 references)
Edward U. Murphy.

Györffy, I. **Trial series of contact lenses for asymmetric eyeballs.** Szemészet **96**: 71-75, 1959.

The determination of the form of greatly asymmetric eyeballs and making a proper shell for them is rather difficult. As a facility for such cases Györffy made a trial series, the members of which correspond to all asymmetries occuring in practice. The series contains 150 pairs of lenses of different hepatics and size arranged in a clear geometrical system. The first five pairs are spherical. If the determination of the eyeball form be started with one of these, the hepatic phenomena observed on the trial serve as a guide.

Apart from this, a deductive mode of using the series ought to be learned. Thereafter, the determination of the shape of the eyeball is nearly as simple as in cases of spherical eyeballs. The shell having proved adequate regarding form and size, it may be used in making the contact lens for the patient. Gyula Lugossy.

Lombard, G. **A simple formula for the threshold of perception of blue and yellow.** Ann. d'ocul. **192**:367-375, May, 1959.

The author develops two simple formulas for thresholds of perception of blue and yellow. He finds that the peripheral limit for these two colors is practically the same but that in the central area the mechanism for perception of yellow is different from that for blue. Curves plotting log of intensity against eccentricity of fixation are given. (4 figures, 4 references) David Shoch.

Maria, Y., Bonnet, R. and Cochet, P. **Optical and mechanical problems in the placement of the Strampelli lenses.** Bull. et mém. Soc. franç. d'opht. **71**:521-531, May, 1958.

The need for very exact calculation of every optical factor involved is shown in this discussion of anterior chamber lenses. The external diameter of the cornea, the posterior diameter of the cornea, corneal curvature, refraction with and without contact lens and the refractive index of the aqueous are all essential data for the prescription of an anterior chamber lens. In spite of the presence of many complicated problems the insertion of a plastic lens is a very promising procedure. (4 figures) Alice R. Deutsch.

von Noorden, G. and Burian, H. **Visual acuity in normal and amblyopic patients under reduced illumination.** A.M.A. Arch. Ophth. **61**:533-535, April, 1959.

The visual acuity was measured with and without the addition of a neutral density filter in patients with normal eyes, squint amblyopia, and with reduced visual acuity due to organic lesions. The normal group showed a reduction of visual acuity to about half with the use of the filter, whereas the group with squint amblyopia showed slight if any reduction of visual acuity. The group with organic amblyopia showed a marked reduction of visual acuity, even more than that in the normal group. These findings tend to emphasize the fact which has been previously established, that the amblyopic eye is not at its best under photopic conditions but that it shows a relative improvement of its functions under mesopic conditions. The application of this neutral-filter test may be of some practical value in determining whether amblyopia in a given case is of pathologic or functional origin. (2 tables, 3 references) William S. Hagler.

Ohm, J. **Endogenous vision.** Klin. Monatsbl. f. Augenh. **134**:664-671, 1959.

The author observed scotomata after prolonged occlusion of his eyes. The scotomata were observed in different colors and patterns in black, red, and faint yellow. Their origin is endogenous and probably due to decreased frequency of oscillatory processes in the chain of the optic neurons. Miners' nystagmus is considered to be the counterpart of this phenomenon. The observation should be taken into account for any theory regarding color vision. (1 figure)

Gunter K. von Noorden.

Remky, Erich. **Tachistoscopic apparent movement.** Arch. f. Ophth. **160**:487-498, 1959.

A short discussion of this phenomenon is based on observations made with tachistoscopically controlled light. (7 references) Edward U. Murphy.

Rocco, A. **The importance of vision in aviation.** Arq. brasil. de oftal. **21**:305-310, 1958.

The author briefly reviews the various visual functions with particular reference to aviation. He discusses visual acuity, luminous sense, color vision, binocular vision, and stereopsis, accommodation and the visual fields. He believes that vision is the most important human function in aviation, but that standards may vary according to the responsibilities of the particular occupation—military pilot, navigator, bombardier, meteorologist, for example. International standards of the various visual functions will result in greater safety. James W. Brennan.

Rodel, Werner. **Clinical investigations into equal and unequal maximum accommodation.** Arch. f. Ophth. **160**:526-533, 1959.

Twenty emmetropes, 38 patients with refractive errors, and 44 with focal disease of the teeth or sinuses were investigated; in 39 with disease accommodation was unequal. In all the others it was equal (4 tables, 19 references)
Edward U. Murphy.

Sachsenweger, R. **Experimental studies on the perception of checkerboard patterns.** Arch. f. Ophth. **160**:490-496, 1959.

The author describes and illustrates with photographs the optical phenomena produced by checkerboard patterns. They have as yet no practical application in clinical refraction. (5 figures, 6 references) Edward U. Murphy.

Schwartz, J. and Ogle, K. **The depth of focus of the eye.** A.M.A. Arch. Ophth. **61**: 578-588, April, 1959.

The criterion of the loss of resolving power (visual acuity) with increase in out-of-focus imagery was used in making measurements on the depth of focus of the human eye. Psychophysical methods with the checkerboard visual acuity test chart were used. All test conditions were held constant, binocular vision was maintained, and time of exposure of the test target was limited to 1/5 second. For three subjects the mean total depth of focus, obtained by means of a test target with resolvable details of angular size equivalent to 20/25 was found to be .94 D. at the 50-percent level of probable visual resolution of the target details. It was found that the depth of focus increased as the target size increased; it decreased as the size of the pupil increased. These results are reviewed briefly by the authors with respect to certain practical applications. (9 figures, 14 references) William S. Hagler.

Sedan, J. **Psychogenic amblyopia.** Ophthalmologica **137**:137-142, March, 1959.

The two cases reported had in common an intense fear of not meeting certain visual requirements which were essential in the professional lives of the patients. A 20-year-old girl had moderate amblyopia of one eye due to strabismus and 20/20 vision in the other eye. In the course of systematic exercises which she prescribed for herself to make the amblyopic eye work and which consisted of reading railroad timetables with the weak eye while the normal eye was occluded, the subjective acuity of the latter declined to 20/40 for distance without measurable impairment of near vision. Terribly worried about her professional future, the patient consulted the author who, after painstaking examination, diagnosed psychogenic amblyopia. He advised systematic occlusion of the amblyopic eye for periods of exactly the same length as used by the patient during her self-prescribed visual exercises. This treatment was completely successful. The visual acuity was restored to normal within 13 days and the patient passed the dreaded examination with flying colors.

In the second case, a 25-year-old male, with one eye weaker as a result of a posttraumatic corneal scar, was preparing himself for a career in the merchant

marines. Ten days after exposure to a mild electric flash (while changing a fuse) the visual acuity in the normal eye began to decline without any perceptible signs of organic disease (particularly no central scotoma). After painstaking but unrevealing search for signs of an organic lesion, the diagnosis of psychogenic amblyopia was made and treatment started with an involved and largely fictitious explanation of the "mechanism" of the disturbance, "special" Zeiss lenses, and a placebo by mouth. Again a complete and lasting cure was accomplished.

Peter C. Kronfeld.

Verain, A. **A new optical illusion.** Arch. d'opht. **19**:22-24, Jan.-Feb., 1959.

The author reports a new optical illusion in which a sensation of depth is produced on a flat oscilloscope screen. The phenomenon can be seen with either eye separately and is variable according to the frequency used in the oscilloscope. The sensation was not produced by the convexity of the oscilloscope screen since this was controlled by the use of mirrors. (6 references) P. Thygeson.

5

DIAGNOSIS AND THERAPY

Arkin, Wiktor and Pawelec, Maria. **Gonioscopy and its clinical application.** Klinika Oczna **28**:365-378, 1958.

The authors present a short history of gonioscopy and describe the appearance of the normal angle of the anterior chamber. The closed and open angle is defined and glaucoma is classified accordingly. The mechanism of an acute attack of closed-angle glaucoma is described in detail. The use of gonioscopy in the evaluation of surgical results is described. Gonioscopy can also be used for inspection of previously inaccessible parts of the anterior chamber. Gonioscopy improved the preoperative judgement permitting the use of a proper surgical method in each case. Congenital glaucoma can be treated surgically with the help of a proper gonioscopic lens. (10 figures, 9 references)

Sylvan Brandon.

Barksy, D. and Schimek, R. A. **Evaluation of absorbable gelatin film (Gelfilm) in cyclodialysis clefts.** A.M.A. Arch. Ophth. **60**:1044-1052, Dec., 1958.

From results of experimental operations in rabbit eyes, the authors conclude that gelatin film is not well tolerated and should not be used in cyclodialysis. (10 figures, 11 references) G. S. Tyner.

Brockhurst, R. J. **Light coagulation with indirect ophthalmoscopy.** A.M.A. Arch. Ophth. **61**:528-532, April, 1959.

A new instrument is described for producing light coagulation in the living eye utilizing indirect ophthalmoscopy for control. Instead of a carbon-arc light source it uses a mercury-vapor-arc lamp. The use of the indirect ophthalmoscope is said to permit more rapid and accurate localization of lesions to be treated, especially those anterior to the equator. Animal experiments were performed and histologic studies made of the chorioretinal burns obtained. Further modifications are contemplated so that an effective clinical instrument for use in man can be perfected. (6 figures, 6 references)

William S. Hagler.

Bryce-Smith, R. and Boston, F. K. **Tubadil in ophthalmic surgery: its effect on intra-ocular pressure.** Brit. J. Ophth. **43**:242-246, April, 1959.

Tubadil is a mixture of bees' wax, peanut oil, oxycholesterols and 25 mg. d-tubocurarine per ml. Intramuscular injections of Tubadil failed to give adequate relaxation of the lid musculature, but there was a drop in the intraocular pressure. The decrease in intraocular pressure was greatest in the cases where the initial pressure

was highest. It may have a place in the cataract surgery of glaucomatous eyes. (8 references) Irwin E. Gaynon.

Cassidy, V. and Havener, W. H. **Evaluation of a screening procedure in the detection of eye disease.** A.M.A. Arch. Ophth. **61**:589-598, April, 1959.

The Harrington-Flock Multiple Pattern Screener was used to test 1,536 persons in the Ohio State University Eye Clinic; 202 patients (13 percent) showed abnormalities by both screener and routine perimetry. Thirty-nine (2.5 percent) false positive tests and 26 (1.7 percent) false-negative tests were found. These 26 false negatives represented 11.5 percent of the 228 patients who had perimetrically detectable defects and it is stressed that the use of the screener is not an adequate substitute for accurate perimetry in evaluation of the early cases of field loss. Therefore the screener is of no value in detecting early glaucoma, and in the authors' series, eight out of 37 cases of glaucoma were missed.

It was noted that 85 percent of the patients with perimetrically demonstrable defects had visual acuity uncorrectibly reduced to 20/40 or less in at least one eye. Therefore the simple measurement of visual acuity is stressed as being a most valuable screening method. (10 figures)

William S. Hagler.

Chamlin, M. **An isopter in the intermediate field of vision.** A.M.A. Arch. Ophth. **61**:608-615, April, 1959.

The author designed and constructed a bowl type perimeter with a 750 mm. radius in order to study the intermediate field of vision. This intermediate field lies between the inner limits of the commonly utilized 1/330 peripheral isopter and the outer limits of the 1/2000 central isopter. Using a 1.3 mm. write test object 63 normal patients were examined. The readings in each meridian were averaged and this intermediate isopter was found to extend to 48 degrees temporally, 34 degrees nasally, 31 degrees above, and 32 degrees below.

It is anticipated that some diseases interfering with the intra- or extraocular visual pathways may show the earliest or most marked visual field defects in this intermediate zone. (6 figures, 6 references) William S. Hagler.

Dugnani, E. **Color photobiomicroscopy with slit illumination.** Klin. Monatsbl. f. Augenh. **134**:674-680, 1959.

A device is described which permits color photography of the different segments of the eye as they are seen by the examiner with the slit beam. Color plates demonstrate the results. (35 color plates, 3 references) Gunter K. von Noorden.

Lichtenstein Luz, R. and Belfort Mattos, R. **Hypnosis in strabismus surgery.** Arq. brasil. de oftal. **21**:299-304, 1958.

An adult man was operated upon for the correction of strabismus while under hypnosis. The patient had had previous strabismus surgery eight years previously, done under local anesthesia. His postoperative course was stormy, with nausea, vomiting and psychomotor disturbance. Hypnotic preparation was done six months prior to the actual surgery, and required eight sessions of progressively deeper hypnosis. At the time of surgery, hypnosis was begun five minutes before operation with the maintenance of anesthesia during the entire procedure. The patient was able to move his eyes whenever instructed to do so, thus allowing the surgeon to evaluate the position of the eye with respect to the amount of surgery being done. At the conclusion of the procedure, suggestion was made to the patient as to the return of normal sensation, amnesia of the operative act and the absence of any postoperative discomfort. He was then discharged and sent home, and, by hypnotic suggestion, slept for about 18

hours. The postoperative course was excellent.

Orthoptics with hypnotic suggestion resulted in complete parallelism of the eyes. In this respect, relaxation of the medial rectus muscles and contraction of the lateral with fusion of images seems to be facilitated by hypnosis. Only about 15 percent of the population can attain such profound hypnosis. In those who can be hypnotized to this degree, new avenues of therapy seem available and should be explored in greater detail. The combination of orthoptics and hypnosis has great possibilities. James W. Brennan.

Maroger, M. **General anesthesia in ophthalmology.** Ann. d'ocul. **192**:255-273, April, 1959.

The author feels that general anesthesia in infants and children presents an increased risk. However, he has had only one death in over 1,000 cases and he ascribes this to the employment of an expert anesthesiologist and careful evaluation of the various anesthetic agents. He presents the characteristics of each of these agents and states that with careful supervision during and after surgery morbidity and mortality can be kept to a minimum. (11 references) David Shoch.

Meacham, C. T. **Vannas scissors for removing corneoscleral sutures.** A.M.A. Arch. Ophth. **61**:654, April, 1959.

The use of the Vannas capsulotomy scissors is advocated for removing corneoscleral sutures. The extremely narrow blades and the spring action handle contribute to their safety as well as ease of manipulation. William S. Hagler.

Nielsen, R. N. **Ocular sarcoidosis.** A.M.A. Arch. Ophth. **61**:657-663, April, 1959.

A thorough review of the systemic and ocular manifestations of sarcoidosis is presented. The etiology of sarcoidosis is still unknown although many believe it is due to a specific virus. In approximately 30 percent of cases there will be ocular involvement. Although almost all structures in and around the eye may become involved, uveitis is the most frequent manifestation and occurs in 55 percent of all cases of ocular sarcoid. The diagnosis is made basically by exclusion, but histological examination of biopsied lymphatic material or of the skin nodule produced by the Kviem test is most helpful. The Kveim test is said to be positive in 80 percent of cases with ocular sarcoid and there are no known false positives. Early and massive treatment with systemic steroids is usually successful in controlling the initial symptoms but prolonged small maintenance doses may be necessary to prevent recurrences. (42 references) William S. Hagler.

Prijoy, E. **Tonography under constant distention of the sclera.** A.M.A. Arch. Ophth. **61**:536-540, April, 1959.

The author describes a method of performing tonography in which the factor of ocular rigidity can be excluded, thus eliminating one of the sources of error in tonography as performed according to the Grant technique. Comparisons of the resistance to outflow of aqueous humor as determined by the two methods were made in normal as well as glaucomatous subjects. The values obtained in the group of normal subjects by the author's method did not differ significantly from those obtained by Grant's method, whereas in the glaucomatous group the values obtained by the author's method were significantly higher. (3 figures, 2 tables, 20 references) William S. Hagler.

Sachsenweger, R. **The determination of congruency in homonymous visual field defects.** Klin. Monatsbl. f. Augenh. **134**: 671-674, 1959.

A method is described which permits

examination of visual fields while both eyes are fixating. This procedure reduces disturbing influences, such as fatigue. The apparatus was applied to the Maggiore projection perimeter and consists essentially of polaroid filters placed before the eyes of the patient. (2 figures, 7 references) Gunter K. von Noorden.

Schweer, G. **Practical experiences with ophthalmodynamometry in vasomotor headache.** Klin. Monatsbl. f. Augenh. **134**: 654-663, 1959.

Vasomotor headache is caused by faulty regulation of the tonus of intracranial arteries. The tonus may be either increased or decreased. The regulation is under the influence of the vasomotor center which itself is dependent on stimuli from the vegetative nervous system. The "medium" retinal artery pressure is measured and computed and brought into relation with the peripheral blood pressure and the intraocular pressure by a method of Weigelin. The information received indicates whether a spastic or dilatory change of the intracranial vascular system is present. Specific treatment with vasoactive drugs can thus be initiated. Positive investigative results with this method, age, sex, and prevalence of one of the two types of vasomotor headaches in a group of patients, are related to already established knowledge on vasomotor cephalgia. (1 figure, 7 tables, 26 references) Gunter K. von Noorden.

Sedan, Jean. **Local antibiotic therapy is sometimes disastrous in ophthalmology.** Ann. d'ocul. **192**:445-453, June, 1959.

The author reports three patients in whom penicillin was used locally for a long time. All showed severe inflammation, punctate keratitis, and corneal ulcers. Healing was rapid when antibiotics were stopped although some permanent impairment of visual acuity resulted. The author makes a plea for conservatism but cautions against exaggerated fear of antibiotics. (15 references) David Shoch.

Smart, D. M. **New type of enucleation scissors.** A.M.A. Arch. Ophth. **60**:1110-1111, Dec., 1958.

A scissors with notched blades is introduced which makes it easier to "trap" the optic nerve. G. S. Tyner.

Sundmark, E. **The contact glass in human electroretinography.** Acta Ophth. Suppl. 52, 1959.

This monograph is based on five papers, three of them already published, two about to be published. The following main points are made: 1. The potential is maximal and constant on recording from different points over the cornea, but falls rapidly on the limbus and posterior to it. 2. The drop between the posterior pole and the reference electrode on the forehead is about 35 percent, the drop between vitreous and recording electrode on the limbal parts of the contact glass is 25 percent. 3. ERG recording with the electrode applied in a contact glass having a scleral part and with a thick precorneal fluid layer is equivalent to strictly corneal recording. 4. A contact glass suitable for human electroretinography should be made of inflexible insulating material, which easily transmits light. The radius of it scleral part should be shorter than that of the eye to be examined, to ensure the occurrence of a distinct, peripheral contiguous margin. A radius of 11 mm. can, with acceptable probability, be expected to fulfill this criterion in examination of adult eyes. The layer of fluid established between glass and eye should have a thick precorneal part, to produce effective short-circuiting of the corneal surface. This can be achieved by means of a glass having a cylindrical part between its corneal and scleral parts. The recording electrode should be placed in the corneal part of the glass, in good con-

tact with the thick part of the fluid layer. (12 figures, 60 references)

John J. Stern.

Thomas, W. C. **New corneoscleral suturing forceps.** A.M.A. Arch. Ophth. **60**:1109, Dec., 1958.

The instrument is described and illustrated. G. S. Tyner.

Vancea, P. and Balan, N. **Histologic modifications of autoclaved skin grafts implanted under the conjunctiva.** Arch. d'opht. **19**:160-164, March, 1959.

The authors discuss the principles of tissue therapy advanced by Filatov in 1933 in which sterilized tissues are placed in unfavorable locations in the host. They have studied autoclaved skin grafts from five to 150 days after subconjunctival implantation. They note that the sterilizing process produces principally a change in the staining properties of the skin. They than discuss the various histologic modifications in the grafts according to the duration of the implantation. These changes are illustrated by photomicrographs in black and white. Absorption of the graft appeared to progress slowly during the 150 days. It is not stated whether human or animal tissues were used in the experiments, which are scantily documented. (4 figures, 2 references)

P. Thygeson.

Vancea, P., Batcu, V., Serban, F. and Popescu, N. **Fever therapy in ophthalmology.** Ann. d'ocul. **193**:423-433, June, 1959.

Twelve patients with diverse eye ailments were given injections of milk (three injections each at three-day intervals) and the biologic responses were noted; all showed an increase in blood sugar during the fever and a decrease in total serum proteins (with a decrease in albumins but an increase in alpha II and beta-globulins). The urinary excretion of 17-ketosteroids varied but there was always a fall from the initial value. (4 figures, 3 references) David Shoch.

6

OCULAR MOTILITY

Benchimol, R. **Orthoptic and pleoptic schools of Europe.** Rev. bras. oftal. **18**:39-53, March, 1959.

The author reports his impressions in Europe, where he visited the orthoptic schools of Bangerter, Cueppers, and Lyle. He describes briefly the equipment used in each school, the pleoptophore in Bangerter's clinic, and the euthiscope and coordinator of Cueppers; Lyle works mainly with the synoptophore and the euthiscope. (19 figures)

Walter Mayer.

Braun-Vallon, S. and Hollier-Larousse, H. **The reeducation of strabismic amblyopes by Cuppers post-image method.** Ann. d'ocul. **192**:121-137, Feb., 1959.

The authors discuss the use of Cuppers method for the treatment of amblyopia. A preliminary examination must first eliminate organic diease as a cause of the amblyopia. If no organic disease is found one may then procede with the use of the euthyscope. This instrument has a powerful light with which one stimulates the macular area to stimulate fixation. In addition occlusion of the good eye is used and when vision improves binocular exercises are prescribed. Since this procedure requires cooperation on the part of the patient it is not usually useful under the age of seven years and it is of little value in older people. The best results are obtained between the ages of eight and 11 years. David Shoch.

Gehrmann, H. **New therapeutic methods in strabismus.** Rev. bras. oftal. **18**:5-31, March, 1959.

The author, a German optometrist,

gives his ideas about the treatment of squint which are totally different from the accepted Anglo-American view. He feels that in cases of amblyopia the best method consists of occluding the amblyopic eye and stimulating it with the euthiscope.

Walter Mayer.

Gehrmann, H. **Psychotherapy of ambliopia.** Rev. bras. oftal. **18**:33-37, March, 1959.

The author, following the ideas of the German school of Giessen, feels that the most important factor in the treatment of squint is the restoration of normal correspondence and fusion. When the patients have diplopia and no degree of fusion has been possible to obtain, he uses psychotherapy to help suppress the nondominant eye. Walter Mayer.

Jensen, O. A. **Seesaw nystagmus.** Brit. J. Ophth. **43**:225-229, April, 1959.

Seesaw nystagmus is rare. It was observed in two patients with thrombosis of the brain stem arteries. The pathogenesis is unknown. The lesion most likely involves the superior part of the medial longitudinal fasciculus, perhaps in the area of the posterior commissure. (12 references) Irwin E. Gaynon.

Mackensen, G. **Monocular and binocular perimetry in active suppression in squint.** Arch. f. Ophth. **160**:573-587, 1959.

The author describes an apparatus for the investigation of suppression by means of static visual fields. Polarizing filters allow the mapping of the fields under binocular conditions. Two patients are studied and the method is discussed. (9 figures, 19 references)

Edward U. Murphy.

Ostachowicz, Mieczyslaw. **Amblyopia in non-squinters.** Klinika Oczna **28**:409-416, 1958.

The author fitted 562 non-squinters with glasses, mostly young people of draft age and who had vision of 0.5 or less after correction in at least one eye. None of them had had any previous eye treatment. Wearing of glasses resulted in improvement of visual acuity of better than 0.5 in 307 individuals. The rate of improvement of visual acuity varied; it was the fastest in patients in whom the refractive error had appeared late and was about equal in both eyes. It was slower and less extensive in cases of considerable anisometropia, except where eyes were myopic. In myopia the weaker eye still could be used for near vision and therefore maintained its functional level. (6 tables, 6 references) Sylvan Brandon.

Parks, M. M. **Isolated cyclovertical muscle palsy.** A.M.A. Arch. Ophth. **60**: 1027-1035, Dec., 1958.

The author describes his method of diagnosing a palsied vertically-acting muscle. The diagnostic steps include determining 1. the higher eye, 2. whether the vertical tropia increases in right or left gaze, and 3. head tilt. Recommendations for surgical correction are made. (9 figures, 9 references) G. S. Tyner.

Pierse, Dermot. **Operation on the vertical muscles in cases of nystagmus.** Brit. J. Ophth. **43**:230-233, April, 1959.

Two cases are described in which nystagmus was marked in all positions of gaze except depression. A recession of the superior oblique and inferior rectus muscles resulted in marked improvement of the nystagmus and of vision. (6 references) Irwin E. Gaynon.

Vancea, P., Vancea, P. P. and Vaighel, V. **The effect of early strabismus surgery on the psychology of the infant.** Ann. d'ocul. **192**:354-361, May, 1959.

The authors review the literature on the psychology of strabismus and con-

clude that psychic disturbances can be the cause of squint, and conversely squint may cause psychologic disturbances in the child. The authors, therefore, make a plea for early surgery (before the age of four years). (10 references) David Shoch.

7

CONJUNCTIVA, CORNEA, SCLERA

Aronson, S. and Shaw, R. **Corneal crystals in multiple myeloma.** A.M.A. Arch. Ophth. **61**:541-546, April, 1959.

A 60-year-old patient with multiple myeloma is described whose cornea and conjunctiva contained deposits of irridescent crystals. These fine crystals were interspersed throughout the entire corneal stroma, but were most dense in the central and anterior layers. Similar but less densely arranged crystals were seen in the superficial layers of the conjunctiva. These deposits were first noted some five years before the systemic disease was diagnosed.

A biopsy specimen of the bulbar conjunctiva was subjected to various histochemical procedures. The results were positive for lipoid and it is probable that these crystals consist of cholesterol.

In an attempt to determine the incidence of this corneal change 13 other patients with multiple myeloma were examined biomicroscopically. Since none of these patients exhibited evidence of crystalline deposits in the cornea or conjunctiva this must be a rare occurrence in patients with multiple myeloma. (4 figures, 8 references) William S. Hagler.

Balik, Josef. **The concentration of sodium in the tears in keratoconjunctivitis sicca.** Arch. f. Ophth. **160**:653-657, 1959.

Balik studied 33 patients with this disease and 30 controls. While the sodium content of the tears is normally dependent on the blood serum sodium level, in keratoconjunctivitis sicca it is quite high and independent of the level in the blood. (2 tables, 1 reference)

Edward U. Murphy.

Barsky, D. **Keratomycosis.** A.M.A. Arch. Ophth. **61**:547-552, April, 1959.

Six cases of fungus infection of the cornea which led to enucleation are reported. Clinically all patients had a dense purulent keratitis with hypopyon, and in only one case was the organism identified clinically.

The author stresses the fact that steroids should not be used whenever a fungus infection is suspected since they reduce the natural inflammatory response of the cornea. Cultures of corneal scrapings are more likely to produce positive results than cultures of conjunctival discharge, and special media, such as Sabouraud's should be used. Pathologically fungus infections may be overlooked unless corneal abscesses are specifically stained with differential stains such as periodic acid-Schiff. The present day treatment of keratomycosis is unsatisfactory. (8 figures, 14 references)

William S. Hagler.

Bauer, F. **The pathologic histology of lattice type corneal degeneration.** Arch. f. Ophth. **160**:560-563, 1959.

With the help of the alkaline silver nitrate impregnation technique, heavy fibers are described which the author believes are degenerated reticular fibers. In the normal cornea they are seen subepithelially as very fine fibrils and are easily overlooked. (2 figures, 17 references) Edward U. Murphy.

Bauer, F. **Histochemical studies of the cloudy cornea with alkaline silver impregnation.** Arch. f. Ophth. **160**:658-662, 1959.

Diseased corneal tissue removed during 50 transplant operations was studied. Two types of fibers were strongly argyrophilic.

One was similar to scleral fibrils and the other showed a lattice-like structure penetrating the corneal epithelium. (4 figures, 15 references) Edward U. Murphy.

Bauer, F. **Alkaline silver impregnation studies of the normal sclera and cornea.** Arch. f. Ophth. **160**:663-667, 1959.

The difference in transparency between sclera and cornea seems to the author to be a result of the condition of the fibrils as revealed by silver staining. Those in the sclera stain heavily while those in the cornea stain practically not at all. This is related to mechanical and biochemical differences starting in embryonic life. (2 figures, 16 references)

Edward U. Murphy.

Calkins, L. L. **Corneal epithelial changes occurring during chloroquine (Aralen) therapy.** A.M.A. Arch. Ophth. **60**:981-988, Dec., 1958.

The author describes a bilateral corneal epithelial change following the clinical use of chloroquine. The change consisted primarily of diffuse, fine, droplet-like opacities limited to the epithelial and subepithelial zones. The changes were reversed by discontinuing the use of the drug. (27 references) G. S. Tyner.

Cogan, D. G. **Arcus senilis.** A.M.A. Arch. Ophth. **61**:553-559, April, 1959.

Pathological and histochemical studies were undertaken on 25 eyes with arcus senilis. Pathologically an arcus was found to be characterized by a hyaline sudanophilia of Descemet's and Bowman's membranes and granular sudanophilia of the corneal stroma. It was invariably associated with a similar sudanophilia of the anterior sclera but the limbus itself was not involved. This sparing of the limbus appears to be related to its vascularity, but the mechanism is not clear.

The staining and solubility studies indicate that the lipid of an arcus senilis consists of noncrystalline phospholipid and cholesterol in some form or other. A glyceride is also probably present but due to the lack of a suitable histochemical test this could not be identified with certainty. Probably these fats are derived from the blood and become secondarily bound to the cornea and sclera. However, the authors were unable to induce any similar binding in vitro by a comparable mixture of lipids from egg yolk. (2 tables, 5 figures, 24 references) William S. Hagler.

Collier, M. **Nodular keratopathy of Fuchs-Salzmann, syndrome of Fuchs-Terrien and allergic oculo-cutaneous manifestations.** Ann. d'ocul. **192**:274-287, April, 1959.

A 76-year-old woman had bilateral marginal degeneration and punctate staining of the cornea and two episodes of hemorrhage within the right eye. The hemorrhages, which the author describes as choroidal, appeared after the administration of an arsenic preparation.

The patient also presented numerous skin lesions which may have been due to sulfonamide and penicillin administration. Nodular dystrophy of the left cornea was also present. The author concludes that an allergic etiology is probably responsible for all the manifestations listed and that this is probably the cause of Salzmann's nodular dystrophy and of the Fuchs-Terrien syndrome generally. (4 figures, 39 references) David Shoch.

Dymitrowska, Maria and Kasanowska, Wanda. **Cytological picture of the smear of the conjunctival epithelium in filamentous keratitis.** Klinika Oczna **28**:379-389, 1958.

The etiology of filamentous keratitis or keratitis sicca is discussed. The possibility of its belonging to the collagen disease syndrome is presented. Views of authorities on virus etiology are cited. The authors examined smears in six cases of

Sjøgren's syndrome and also made biopsies of the conjunctiva. Changes were found in the nuclei and the cytoplasm. In the epithelial cells particles were found which resembled inclusion bodies of Prowazek. Lymphocytes were very numerous whereas monocytes and eosinophilic leucocytes were seen only occasionally. Cytologic and histologic changes suggested a viral etiology of the filamentous keratitis. No influence of cortisone could be demonstrated after topical application of 1-percent ointment. (10 figures, 2 tables, 38 references) Sylvan Brandon.

Epstein, S. and McCormick, G. L. **Conjunctivitis due to neomycin sensitivity.** A.M.A. Arch. Ophth. **60**:1000-1002, Dec., 1958.

The authors report four cases of neomycin sensitivity to alert the profession to the possibility of this drug acting as a sensitizer. (5 references) G. S. Tyner.

Fine, Max. **The surgical treatment of herpetic keratitis.** California Med. **90**:121-125, Feb., 1959.

Among 48 keratoplasties performed on 40 patients with various forms of corneal herpes, in 16 the operation was done for optic reasons. The other 32 operations were done for therapeutic reasons in eyes with chronic or subacute herpetic keratitis. The author reconfirms the view that corneal transplantation offers the only effective means of treatment of recurrent or chronic herpetic keratitis. Even in cases in which the transplant did not remain clear, pain and congestion were almost immediately relieved. (4 figures, 12 references) Frederick C. Blodi.

Hryniewska, Halina. **Action of cortisone in corneal disease particularly of viral and allergic etiology.** Klinika Oczna **28**: 417-420, 1958.

The author discusses the action of cortisone in general and particularly its anti-inflammatory properties. Where inflammatory reaction of the tissue is necessary to counteract the invading agent, cortisone is contraindicated. In conditions in which allergic reaction is prevalent application of cortisone gives very good results. In some viral infections the use of cortisone gives very good results as, for example, in disciform keratitis. It is also of great help in phlyctenular and in interstitial keratitis. Use of cortisone after corneal transplants resulted in an increased number of clear corneas. Sylvan Brandon.

Konarska, Barbara. **Application of novocain block in corneal disease.** Klinika Oczna **28**:429-432, 1958.

Novocain block interrupts a pathologic reflex and increases the tonus of the vegetative system. The block could be applied in the area of the ciliary arch, of the zygomatic arch, subconjunctivally around the limbus and retrobulbarly. Novocain block was given to 17 patients and only in three of them was there no improvement. The best results were obtained where trophic nerves of the cornea were involved. Injections were made every five days and usually after the second application considerable recession of disease could be noticed. Two cases are described in detail for illustration. (1 table, 6 references) Sylvan Brandon.

Kora, T. **Ocular symptoms of probable acute febrile pemphigus.** Acta Soc. Ophth. Japan **63**:19-24, Jan., 1959.

A case of acute febrile pemphigus in a 25-year-old man is reported. The onset of the disease was acute with a high fever and vesicle formation throughout the body surface. Ocular symptoms were a pseudomembranous conjunctivitis followed by a cicatrization and a stubborn epithelial keratitis. (3 figures, 1 table, 15 references) Yukihiko Mitsui.

Matuo, N. **A study of conjunctival fol-**

licles. Acta Soc. Ophth. Japan **63**:339-344, Feb., 1959.

Expression smears of follicles from 130 cases of trachomatous and follicular conjunctivitis and 120 of nontrachomatous were examined. The cytology was then studied in detail. The incidence of macrophages is considerably higher in trachoma; it has a diagnostic value. (8 tables, 32 references) Yukihiko Mitsui.

Offret, G. and Haye, C. **The basal membrane of the corneal epithelium. A histopathologic study.** Arch. d'opht. **19**:126-159, March, 1959.

The authors describe a layer intermediate between the corneal epithelium and Bowman's membrane which they term the basal membrane of the corneal epithelium. Histologically its demonstration requires special stains such as the MacMannus stain, and owing to its polysaccharide content it takes an intense red coloration. Histochemically it contains a complex polysaccharide. It is continuous with the basal membrane of the conjunctival epithelium. Its involvement in pathological conditions is variable. It rarely remains intact in dystrophies and is initially involved in keratoconus. The membrane can regenerate after corneal wounds and generally is intact over leucomas. It appears to play a role in the cohesion and regularity of the epithelium. The article is illustrated by six photographs in color. There is an extensive discussion and a bibliography. (6 figures, 44 references) P. Thygeson.

Rudobielski, Romuald. **Novocain block of the ciliary ganglion in corneal disease.** Klinika Oczna **28**:421-427, 1958.

The author used retrobulbar injection of novocain in 26 patients with corneal diseases. There was immediate subjective improvement with increase of mydriasis and decrease of photophobia and pain. Treatment directed against the causative agent was continued. Improvement followed in 21 patients, four remained unchanged, and one became worse. The author concludes that retrobulbar novocain block is of help in chronic stubborn cases, particularly when trophic changes are present. Etiologic treatment, however, is necessary to assure complete healing. Two cases are described in detail for illustration. (1 table, 16 references) Sylvan Brandon.

Stoicanu, N. and Pascu, M. **Clinical considerations on four cases of pemphigus of the conjunctiva.** Arch. d'opht. **19**:31-37, Jan.-Feb., 1959.

In the eye clinic of Bucharest the authors have observed, over an eight-year period, four cases of pemphigus with ocular involvement among 16,000 hospitalized patients. The cases are reported in detail. Two had skin lesions characteristic of pemphigus whereas the other two had conjunctival lesions without other manifestations. The authors describe the first two cases as acute pemphigus and the last two as chronic pemphigus, but consider them all as etiologically identical. They fail to mention the current concept of pemphigus vulgaris and benign mucous membrane pemphigoid as two clinically distinct entities with entirely different prognoses. One of their four cases was in an infant—a very rare finding if their diagnosis was correct. (3 figures, 16 references) P. Thygeson.

Vancea, P., Lazarescu, D., Cerne, G. and Vaighel, V. **Primary sarcoma of the conjunctiva with generalization to the entire lymphatic system.** Arch. d'opht. **19**:5-12, Jan.-Feb., 1959.

The authors report a rare case of primary sarcoma of the conjunctiva involving both eyes of a 43-year-old man, with generalized adenopathy. There was no modification of the blood picture. Histologic examination of the conjunctival

lesions and of excised tissue showed the same sarcomatous picture. After extensive radiotherapy the lesions regressed, but the patient was losing weight when last examined. A review of the literature indicated that a survival time of from three to 13 years is expected. The article is documented by four photomicrographs of the tumor in black and white. (4 figures, 5 references) P. Thygeson.

Wasilewski, Mieczyslaw. **The influence of refractive errors on the appearance of phlyctenular conjunctivitis.** Klinika Oczna **28**:405-408, 1958.

The author presents the results of examination of 100 children with phlyctenular conjunctivitis. Only 12 among them were found to be emmetropic. In 58 children phlyctenules were unilateral. In ten patients disease paralleled an increase in refractive error. In 41 patients general examination revealed some form of tuberculosis. The author feels that refractive error predisposes the eyes to phlyctenular inflammation; he therefore advocates treatment with atropin in addition to the usual general treatment necessary in these children. Paralysis of accommodation puts the eye in a resting state and facilitates healing. (1 table, 15 references)
Sylvan Brandon.

8

UVEA, SYMPATHETIC DISEASE, AQUEOUS

Descamps, J. **Radiotherapy in the treatment of uveal inflammations.** Ann. d'ocul. **192**:288-302, April, 1959.

The author lists 12 cases of uveitis in which he used X-ray therapy, the details of which he records. It should be noted that mydriatics and steroids were employed concurrently. All patients showed a good response to this therapy and in no case was there any permanent damage to the lens or other ocular structure. X-rays are a valuable adjunct in the treatment of uveitis and in the dosage recommended they are without risk to the eye. (35 references) David Shoch.

Duke, J. R. and Kennedy, J. J. **Metastatic carcinoma of the iris and ciliary body.** A.M.A. Arch. Ophth. **60**:1092-1103, Dec., 1958.

Four cases are reported in which there was an occurrence of metastatic carcinoma in the anterior segment of the eye. Interestingly the recurrence was predominantly in the right eye which is unusual; the usual site is the left eye. (15 figures, 6 references) G. S. Tyner.

Hudelo, A., Collier, M. and Maussion, L. **Arcuate traumatic choroiditis.** Ann. d'ocul. **192**:416-422, June, 1959.

The authors report two cases of immediate rupture of the choroid in which an arcuate choroiditis developed. This occurred 24 days after the original injury in one case and 10 days after it in the second. The authors feel that these late lesions are due to tissue necrosis from edema and not from the original trauma. (7 figures, 6 references) David Shoch.

Sturman, R. M., Laval, J. and Weil, V. J. **Leptospiral uveitis.** A.M.A. Arch. Ophth. **61**:633-639, April, 1959.

The world literature on leptospiral uveitis is reviewed and discussed. Weil's disease may be definitely established by the isolation of the causative organism in the blood or urine and by the demonstration of specific lysins and agglutinins in the serum. Uveitis as a complication may occur from weeks to months after the onset of the systemic disease. On several occasions the leptospirae have been cultured from the aqueous.

A case is reported of severe recurrent leptospiral uveitis in one eye which first developed several months after the onset of Weil's disease. Exacerbations of an-

terior uveitis occurred over the next three years which were controlled with medical therapy. The uveitis was eventually complicated by severe glaucoma and cataract formation which necessitated lens removal. (26 references)

William S. Hagler.

Waubke, T. **The pathogenesis of Jensen's chorioretinitis juxtapapillaris.** Klin. Monatsbl. f. Augenh. **134**:627-643, 1959.

The author observed 67 cases of Jensen's chorioretinitis in a group of 526 patients who had choroidal disease. The seat of the lesion is in the choroid rather than in the retina. It is characterized by nerve fiber damage. Form and distribution of the visual field defect depends on the extent of the pathologic changes in the nerve fibers. The location of the disease is not limited to juxtapapillary areas. Peripheral foci have been observed. There is no etiologic difference between Jensen's type and other forms of chorioretinitis. Jensen's disease occurred most frequently in the third decenium; relapses were observed less frequently if the onset of the disease fell within this period of life. Jensen's chorioretinitis may be the manifestation of a hyperergic reaction. (11 figures, 2 tables, 41 references)

Gunter K. von Noorden.

9

GLAUCOMA AND OCULAR TENSION

Becker, B. **Glaucoma, 1957-1959.** A.M.A. Arch. Ophth. **60**:1112-1150, Dec., 1958.

This is an excellent and comprehensive review with lucid interpretations by the author. (820 references) G. S. Tyner.

Bock, J. and Stepanik, J. **Tonographic investigation of glaucoma in myopic eyes.** Arch. f. Ophth. **160**:564-572, 1959.

In 57 myopic eyes suspected of glaucoma, the diagnosis was established in 35 with the help of tonography. The myopia was the pathologic type with most of the refractive errors −13.00 D. or greater. (5 tables, 18 references)

Edward U. Murphy.

Eurico Ferreira, L. **Surgical treatment of glaucoma.** Arq. brasil. de oftal. **21**:311-326, 1958.

Although surgery is a major weapon in combatting glaucoma, it is not an ideal solution to the problem, since the pathogenesis of the disease is not clear. There are two general types of surgery—one which reduces the impairment of outflow and the other which reduces the production of aqueous. Among the former are iridectomy, iridencleisis, goniotomy, and cyclodialysis, while cyclodiathermy, cycloelectrolysis and retrociliary diathermy are examples of the latter. Before attempting surgery, one should examine the eye thoroughly and include gonioscopy in the procedures. The patient should be prepared for operation, both physically and mentally. The author recommends local anesthesia preceded by an injection of dilaudid and scopolamine.

In iridectomy, the ab externo incision combined with the Minsky technique of locating the surgical limbus is recommended. Peripheral iridectomy is effective in favorable cases of acute glaucoma. Two pillars are used in iridencleisis, and the surgeon may preserve the iris sphincter if he wishes.

Several modifications of sclerectomy are mentioned. Complications of the various operations are discussed, among which is the progression of lens opacities after fistulizing operations. The ab externo incision minimizes many of these operative complications.

Cyclodialysis is recommended for glaucoma in aphakia by most authors, and may be done in several ways, and may be repeated safely.

The application of diathermy is effective in controlling tension and has little

danger of postoperative infection or hemorrhage. There is minimal postoperative irritation and it may be repeated or used after other procedures. However, there may be grave consequences such as corneal anesthesia, atrophy of the globe or sympathetic ophthalmia.

Surgical intervention is indicated in almost all cases of narrow-angle glaucoma, the choice of procedure varying with the severity and duration of the attack. The indication for surgery in open-angle glaucoma, on the other hand, is not as definite and requires evaluation of many factors, such as central acuity, loss of field, effects of medication, and gonioscopy.

The author points out that normalization of the tension does not indicate a cure of the disease and that the patient requires continued observation and care.

James W. Brennan.

François, J. and de Rouck, A. **Electroretinography in primary glaucoma.** Ann. d'ocul. **192**:321-353, May, 1959.

Three different techniques were used to study the electroretinogram in patients with primary glaucoma: the method of Karpe, the neon stroboscope, and the xenon stroboscope. The experimental group was varied; some patients had open-angle glaucoma with and without surgery and some had the closed-angle type. The authors found that the E.R.G. is usually normal in both open and closed-angle glaucoma. However the mean amplitude of the b-wave is slightly reduced in open-angle glaucoma exposed to the highest intensity of the xenon light. On the other hand, the mean amplitude of the b-wave is slightly increased in narrow-angle glaucoma but only under Karpe's lamp. Only in late, absolute glaucoma is the E.R.G. extinguished. The authors feel that in open-angle glaucoma any alteration in the E.R.G. is related more to vascular sclerosis than to nerve tissue injury; in any case the receptoral layer of the retina appears to be uninvolved. (25 figures, 10 tables, 19 references) David Shoch.

François, J. and Verriest, G. **The acquired dyschromotopsies in primary glaucoma.** Ann. d'ocul. **192**:191-199, March, 1959.

The authors tested approximately 60 patients who had glaucoma; about half of them had open angle glaucoma and the other half closed angle. In both groups they found a very high incidence of subnormal color sense in the blue-yellow range. About one-third of each group showed definite blue-yellow blindness, another third showed simply a deficient blue-yellow sense, and the remaining third of each group was normal. This is a much higher incidence than might be expected, and the authors feel that it probably implies a deficiency of the deep layers of the macular region of the retina. They do not believe that nerve-fiber-bundle lesions can cause this type of defect. (23 references) David Shoch.

Giles, C. **Tonometer tensions in the newborn.** A.M.A. Arch. Ophth. **61**:517-519, April, 1959.

Tonometric measurements using a Schiøtz tonometer and a standard adult calibration scale were made in 110 newborn infants within one hour after birth. Only 32 of these measurements were considered accurate enough for statistical study. In most cases the pressure approached the upper limits of adult normality and in no case did the intraocular pressure exceed 30.4. Neither the type of maternal anesthesia nor the method of delivery influenced the ocular tension. Since the calibration scale (year not given) was calculated for average adult scleral rigidity as well as average adult corneal curvature, the recorded pressure in children cannot be strictly compared to that in adults. However, this study shows that routine adult tonometers and scales may

be used to obtain a useful estimation of the intraocular pressure in infants. (2 tables, 3 references) William S. Hagler.

Klikova, A. L. and Libman, E. S. **LaGrange-Holt-Filatov operation in glaucoma.** Vestnik Oftal. **6**:25-31, Nov.-Dec., 1958.

Iridencleisis with sclerectomy was carried out on 54 patients with glaucoma of various types and stages. The operation was found to be highly effective; it is indicated in primary and uveal glaucoma during early stages as well as in far advanced glaucoma. Normalization of ocular tension was obtained in a large percentage of patients. The postoperative course was relatively uneventful and in a large majority of cases there were no grave complications. (1 table, 22 references) Victor Goodside.

McBain, E. H. **Tonometer calibration.** A.M.A. Arch. Ophth. **60**:1080-1091, Dec., 1958.

The author points out from data obtained by strain-gauge measurements that it is not possible to express the rigidity of the eye by a single number. Two coefficients are apparently required. (4 figures, 6 tables, 14 references) G. S. Tyner.

Priegnitz, F. **Juvenile glaucoma.** Klin. Monatsbl. f. Augenh. **134**:711-715, 1959.

The clinical history of two patients is reviewed. One case was a transitional type between megalocornea and buphthalmos. In the second case, in a ten-year-old girl, spherophakia was associated with secondary glaucoma. The therapeutic possibilities are briefly discussed. (2 figures, 5 references) Gunter K. von Noorden.

Turi, Karoly. **Changes of intraocular pressure in electric shock.** Klinika Oczna **28**:391-394, 1958.

The author measured intraocular pressure in 15 patients receiving electric shock treatment. Measurements were taken before application of the current, during the shock, after the first breath and 30 minutes later. The pressure rose considerably during the shock and returned to normal after the first breath. Of patients to whom insulin shock was given, only those who had seizures had an increase of intraocular pressure. Patients receiving shock under Evipan anesthesia had only little change in pressure. The author feels that the level of intraocular pressure is influenced by the changes of blood circulation in the skull and in the venous sinuses of the orbit. (2 figures, 1 table, 16 references) Sylvan Brandon.

Weekers, L. **Therapeutic principles in glaucoma.** Arch. d'opht. **19**:270-288, April-May, 1959.

The author summarizes present concepts of therapeutics in glaucoma. He stresses that even a minimal rise in pressure, if continued, will eventually lead to complete loss of vision. Medical treatment, he believes, should be regarded, except in rare instances, as a means of retarding but not preventing the eventual unhappy outcome. He feels that surgical treatment offers the best protection for the optic nerve. He advocates early surgery. Late surgery he considers much less satisfactory and largely responsible for the bad reputation that attaches to glaucoma surgery. (1 figure, 2 tables, 38 references) P. Thygeson.

10

CRYSTALLINE LENS

Ainslie, D. **Cataract extraction with the aid of alpha-chymo-trypsin.** Brit. J. Ophth. **43**:200-201, April, 1959.

Alpha-chymo-trypsin was used in 32 consecutive extractions. Striate keratitis appeared in 16 of 24 cases where the erisophake was used. Striate keratitis did not appear after the use of capsule forceps. (1 reference) Irwin E. Gaynon.

Barthelmess, G. and Borneff, J. **Industrial injury of the lens with heat rays.** Arch. f. Ophth. **160**:641-652, 1959.

The previous literature is summarized and the slitlamp findings in 168 iron workers and 108 glass workers are described. Only four of the glass workers and none of the iron workers showed the characteristic lens changes. The authors feel that the air temperature of the room may be significant. The scleral vessels through their deeper connections carry heat to the equatorial region of the lens and this adversely affects the developing cells. In addition, the iris vessels absorb heat and transmit it to the cells of the anterior capsule. (4 tables, 36 references) Edward U. Murphy.

Calamandrei, G. **Pre- and post-operative risks in cataract surgery on patients over 80 years of age.** Ann. d'ocul. **192**:138-149, Feb., 1959.

The author reports 23 octogenarians who had cataract surgery. He advises a complete physical examination before surgery and hospitalizes his patients several days before surgery; this gives him an opportunity to evaluate the patient's response to the various drugs to be used during and after surgery. He is a strong advocate of the use of transquillizers, such as meprobamate. Postoperatively only the operated eye is covered and the patient is got out of bed in the evening after surgery. A nutritional supplement of sugar and fruit juices is given. With these precautions cataract surgery in the aged can be a safe procedure. David Shoch.

Cogan, J. E. H., Symons, H. M. and Gibbs, D. C. **Intracapsular cataract extraction using alpha-chymo-trypsin.** Brit. J. Ophth. **43**:193-199, April, 1959.

Alpha-chymo-trypsin (A.C.T.) was used in a series of 122 patients. After corneal section, the anterior chamber was irrigated with Ringer's solution. A 1 : 5,000 solution of A.C.T. was introduced into the anterior chamber by means of a lacrimal syringe, flooding the subiridic space in all directions. After three minutes it was flushed out with Ringer's solution. Controlled vacumetric suction of 250 mg. Hg was used in 72 cases. The Arruga forceps was used in the remainder. "The battle between the zonule and the capsule is already won when one comes to remove the lens." (2 references) Irwin E. Gaynon.

Ellis, G. S. and Haik, G. M. **Management of congenital cataracts in children.** Louisiana St. M. Soc. J. **111**:56-63, Feb., 1959.

The authors first describe the various types of congenital cataracts. Operation is only advised when the vision in the better eye is less than 20/50. If the cataracts interfere with fixation, the operation on the first eye is done at the age of six months. The second eye is operated on at the age of two or three years. (8 references) Frederick C. Blodi.

Linner, E. **The rate of aqueous flow in human eyes with and without senile cataract.** A.M.A. Arch. Ophth. **61**:520-527, April, 1959.

With the use of the suction-cup method the rate of aqueous flow was measured in human eyes with and without cataracts. The suction cup, placed perilimbally upon the eye, compresses the conjunctival and episcleral veins, thus blocking the outflow channels for aqueous humor and bringing about an increase in the intraocular pressure. From the increase in pressure during a 15-minute application of the suction cup, the increase in volume and the rate of aqueous flow can be calculated.

Although it was found that aqueous flow diminished with age in both groups, it was significantly lower in the group with senile cataracts as compared to those of the same age without cataracts. It is therefore assumed that there is a relation-

ship between the senile cataract and the reduction of aqueous flow. It is suggested that agents which cause an increased aqueous flow may possibly delay or prevent the formation of senile cataracts. A nicotinic acid preparation, Hexanicit, was found to cause a significant increase in aqueous flow in a preliminary study. (6 tables, 21 references) William S. Hagler.

Owens, W. C. **The lens and vitreous, annual review.** A.M.A. Arch. Ophth. **61**: 664-673, April, 1959.

This is a concise and selective review of 117 articles published during 1958 which dealt with the lens and vitreous. (117 references) William S. Hagler.

Vassilev, I., Dabov, St. and Rankov, B. **Congenital cataract provoked experimentally by dinitrophenol.** Arch. d'opht. **19**: 13-18, Jan.-Feb., 1959.

The authors report a study of congenital cataract in young rabbits produced by intravenous injection of dinitrophenol solution in their mothers who themselves remained free from lens opacities. The congenital cataracts produced involved typically the central and posterior cortical layers. No other modifications of the visual apparatus were noted in the young rabbits. (3 figures, 8 references)

P. Thygeson.

Wilmersdorf, J. and Attadia, E. **Our experience with a buried suture in cataract surgery.** Rev. bras. oftal. **18**:55-61, March, 1959.

The authors review briefly the different types of sutures used in cataract surgery and conclude that the buried type of virgin silk suture, combined with a large conjunctival flap, is the best type of suture available. (9 references)

Walter Mayer.

Zorab, E. C. **Alpha-chymo-trypsin in cataract extraction.** Brit. J. Ophth. **43**:202-203, April, 1959.

The author concludes, after a series of 26 cases, that for the patient over 60 years of age the addition of A.C.T. is of so little advantage as to be scarcely worth the manipulations. The younger the patient, the greater the advantage of using A.C.T. In patients aged one year, 32 years and in several aged 50-odd years, cataracts were removed with equal ease.

Irwin E. Gaynon.

11

RETINA AND VITREOUS

Bonamour, Georges. **Medical detachments of the retina.** Ann. d'ocul. **192**:161-174, March, 1959.

The author feels that although retinal detachment is primarily a surgical disease of the eye there are certain cases that may be considered as medical detachments, and he feels that medical treatment increases the chance of success in these cases. He includes in this group detachment accompanied by retinal edema such as is found in hypertension, and a second group of detachments occurring with vascular disease of the choroid. The third group occurs with disease of the vitreous such as Eales' disease, angiomatosis, and diabetic retinitis. Finally there is the group associated with uveitis. In all these cases proper therapy of the underlying medical condition will either cure the detachment or increase the chance of success with surgical repair. (20 references)

David Shoch.

Brockhurst, R. J., Schepens, C. L. and Okamura, I. D. **The scleral buckling procedures.** A.M.A. Arch. Ophth. **60**:1003-1012, Dec., 1958.

This is the third in a series of related articles. This paper deals with the technical difficulties encountered in reoperations for retinal detachment. The princi-

pal difficulties are pointed out and discussed. These consist of conjunctival adhesions and granulomas which, with muscle adhesions, prevent easy exposure; the friability of the sclera; and identifications of vortex veins and scleral perforations. (6 figures, 3 references) G. S. Tyner.

Duque, W. **Recent advances in retinal detachment surgery.** Rev. bras. oftal. **18**: 67-78, March, 1959.

The author describes the newer diagnostic techniques in the study of a detachment, such as the use of the Hruby lens, and the binocular indirect ophthalmoscope, and biomicroscopy of the vitreous and retina. He then describes briefly the major operative techniques like penetrating and lamellar scleral resection, scleral buckling procedures with and without an encircling tube, photocoagulation, and transplants of vitreous. He himself uses either the classical diathermy procedures or the scleral buckling type of operation, according to the findings in each particular case. (22 references)

Walter Mayer.

Fischer, Franz. **Diabetic retinopathy progressing to retinitis proliferans.** Arch. f. Ophth. **160**:555-559, 1959.

Nine cases were followed closely and the author feels that it is not the time of onset of the diabetes, nor its duration, nor the adequacy of the control that is important in the progress of the deleterious changes, but a fundamental inherited "blood vessel constitution." (1 reference)

Edward U. Murphy.

Goryachev, Y. E. **A rare case of extraction of non-magnetic foreign body from the vitreous.** Vestnik Oftal. **6**:41-44, Nov.-Dec., 1958.

A piece of copper wire (1.5 mm. in length, 1.3 mm. in diameter and 0.2 mg. in weight) was removed seven days after perforating injury. Incision was made in the sclera and the foreign body was removed under direct visual control with the ophthalmoscope. Partial traumatic cataract made it somewhat difficult to see. Visual acuity two and one-half months after surgery was 50 percent. (1 figure, 12 references) Victor Goodside.

Krill, A. and Iser, G. **Unilateral retinitis pigmentosa with glaucoma.** A.M.A. Arch. Ophth. **61**:626-630, April, 1959.

A case of unilateral retinitis pigmentosa with associated glaucoma occurring in a 48-year-old woman is presented. Although the left eye was entirely normal, the right eye revealed a posterior polar cataract, an atrophic cupped disc, bone-spicule pigmentation of the mid-periphery, and attenuation of the arterioles, The visual acuity in this eye was reduced to 20/70, the central field was constricted to five degrees, a dark adaptation curve revealed a very elevated monophasic response, and the electroretinogram was extinguished. There was no evidence of either retinitis pigmentosa or glaucoma in the fellow eye. No details regarding the glaucoma in the right eye are presented other than the fact that "⅔ of the angle was filled with synechiae."

Only 25 cases of unilateral retinitis pigmentosa have been reported previously and none of these had associated glaucoma. The late age of onset with the lack of familial history of consanguinity or ocular disease is said to be usual in unilateral cases of retinitis pigmentosa. (25 references, 7 figures) William S. Hagler.

Paufique, L., Fayet and Ravault, M. **Comparative study of normal and lyophilised human vitreous.** Ann. d'ocul. **192**:241-254, April, 1959.

Because of the current interest in transplantation and implantation of vitreous, the authors investigated the feasibility of using lyophilised vitreous. Since the latter can be stored indefinitely it has an advan-

tage over the use of fresh vitreous.

The vitreous from 200 human eyes was lyophilised and its characteristics compared with those of normal vitreous. The authors could demonstrate no alterations in index of refraction, viscosity, conductivity, or pH. The clinical characteristics also remained unchanged. Electrophoretic studies of vitreous protein showed no change after lyophilisation. (2 figures, 7 tables, 10 references) David Shoch.

Sedan, Jean. **Traumatic detachments and myopia.** Ann. d'ocul. **192**:175-179, March, 1959.

The author reviews eight cases of retinal detachment that were definitely traumatic in origin. He finds that in only one of these was there a severe myopia, in two a moderate myopia, and in five there was no myopia at all. This agrees with other statistics he quotes from the literature. He concludes that a detachment in an eye that is not myopic suggests a traumatic origin. David Shoch.

Takareva, B. A. **Non-perforating cyclodiathermy in congenital hydrophthalmos and other forms of glaucoma in children.** Vestnik Oftal. **1**:3-8, Jan.-Feb., 1959.

Nonperforating cyclodiathermy was performed on 22 eyes of 17 children with congenital glaucoma in various stages of development. Six such operations were performed in other forms of glaucoma in children. Good results were obtained when the operation was used prior to subsequent iridencleisis or corneoscleral trephining. Cyclodiathermy was also found useful as an additional intervention following fistulizing operation when the latter did not result in normalization of intraocular pressure. Cyclodiathermy was used with success as an independent procedure when other surgery was contraindicated.

The operation was carried out with an electrode of 1.5 mm. diameter, placed directly on the sclera 7 mm. from the limbus; 12 to 20 contacts were made between the insertions of the rectus muscles, each contact lasting one or two seconds, at intervals of 2 mm. Victor Goodside.

Viefhues, T. K. and Strobel, W. **Clinical study of retinopathy in anemias.** Klin. Monatsbl. f. Augenh. **134**:643-654, 1959.

The retinopathy is often influenced by the basic disease of which anemia is only a symptom. Retinal hemorrhages cannot be explained by anemia alone. Stasis and toxic or hypoxic damage to the vascular wall are named as additional factors. In 13 out of 23 anemic patients pathologic changes in the serum proteins were noted. Nine patients of the group of 13 presented bilateral retinal hemorrhages. In the remaining group of ten patients the serum proteins were normal and retinopathy was not observed. A group of 14 non-anemic patients who had pathological shifts in their serum proteins served as a control. None of these patients had retinopathy. Abnormalities of the serum protein seem to play an additional role in the etiology of retinal hemorrhages in anemic patients. (3 figures, 3 tables, 28 references)

Gunter K. von Noorden.

12

OPTIC NERVE AND CHIASM

Glew, W. B., Kearns, T. P., Rucker, C. W. and Essex, H. E. **The experimental production of papilledema.** A.M.A. Arch. Ophth. **60**:1074-1079, Dec., 1958.

The authors report the inconsistent production of papilledema in two of six monkeys by the use of inflation of a subdurally placed balloon. (5 figures, 13 references)

G. S. Tyner.

Lasco, F., Minculesco, C. and Simionesco, M. **The ophthalmoscopic appearance of cerebral metastases. Hemorrhagic stasis of the papilla.** Arch. d'opht. **19**:165-169, March, 1959.

Tumors metastasizing to the brain frequently lead to stasis of the papilla. In the authors' series of 134 cases this occurred in 61 percent. The clinical picture appears characteristic, with hemorrhage a prominent feature. In 242 of the cases the hemorrhages extended into the extreme periphery. While the lesion cannot be considered constant or pathognomonic of cerebral metastasis, its presence must be considered highly suggestive. (3 tables, 2 references) P. Thygeson.

Lasco, F., Nicolesco, M. and Niculiu, I. **Retrobulbar pseudoneuritis from endocranial metastasis.** Arch. d'opht. **19**:19-21, March, 1959.

Sudden loss of vision occurring in an otherwise healthy person can be the first clinical sign of endocranial metastatic tumor. The authors report observations of two cases, both resulting from cancer of the breast. In both, the pseudoneuritis was unilateral and was not accompanied by disc changes. The metastases were subdural near the optic nerves. The authors could find only one similar report in the literature (Calmettes, Tabarly and Dillange, 1949). (1 reference) P. Thygeson.

Neubauer, H. and Karges, E. **Treatment with corticosteroids in optic neuritis.** Klin. Monatsbl. f. Augenh. **134**:615-626, 1959.

Treatment with steroids is effective against the symptoms rather than the actual causative disease. Their action is directed against inflammatory changes of the interstitial tissue of the nerve. Twelve cases are reported. Higher dosages of steroids had to be employed in patients in whom the optic neuritis was secondary to disseminated encephalomyelitis. A daily dosage of 30 mg. prednisolon was found to suffice in apparently isolated neuritis of the optic nerve and resulted in improvement of visual acuity and field changes. By their anti-inflammatory action, the corticosteroids prevent secondary changes of the nerve fibers which may occur with the healing process. (5 figures, 9 references) Gunter K. von Noorden.

13

NEURO-OPHTHALMOLOGY

Hoyt, W. F. and Walsh, F. B. **Cortical blindness with partial recovery following acute cerebral anoxia from cardiac arrest.** A.M.A. Arch. Ophth. **60**:1061-1069, Dec., 1958.

The authors bring out some very interesting features of cortical blindness in their report of a patient who suffered cortical blindness following cardiac arrest. The special feature of the paper is the fact that the patient completely recovered from all other effects of anoxia; only visual impairment from cortical involvement persisted. (4 figures, 18 references) G. S. Tyner.

Wania, J. H. and Walsh, F. B. **Absence of ocular signs with cerebellar ablation in an infant.** A.M.A. Arch. Ophth. **61**:655-656, April, 1959.

A six-week-old infant was born with a large cystic lesion of the cerebellum which protruded through a bony defect in the occipital bone. There were no cerebellar signs either before or after complete cerebellar ablation and none have developed during the two years after surgery. This lends support to the present concept of cerebellar ablation which has been determined in experimental animals. (3 references) William S. Hagler.

NEWS ITEMS

EDITED BY DONALD J. LYLE, M.D.
411 Oak Street, Cincinnati 19, Ohio

News items should reach the editor by the 10th of the month. For adequate publicity, notice of postgraduate courses and meetings should be received three months in advance.

DEATHS

Dr. Carl Abraham Noe, Cedar Rapids, Iowa, died May 26, 1959, aged 89 years.

ANNOUNCEMENTS

OPHTHALMOLOGISTS WANTED

American Board qualified or certified ophthalmologists are wanted for unlimited ophthalmologic surgery for four to six-week periods in Vietnam, Malaya, Korea, and possibly India. Room and board in the Far East will be provided. Round trip transportation must be borne by the ophthalmologist himself; however, these expenses along with other incidental travel expenses may be deducted from U. S. Federal income tax. It is possible that one-way transportation to the Orient may be provided aboard the USS Constellation, backed by Project HOPE of the People-to-People Health Program. For further information, write Dr. William John Holmes, Secretary General, Asia Pacific Academy of Ophthalmology, 280 Alexander Young Building, Honolulu 13, Hawaii.

SEMINAR ON GLAUCOMA

A seminar on glaucoma with particular emphasis on gonioscopy and the study of the anterior angle will be given at the Brooklyn Eye and Ear Hospital on November 16th, 17th, and 18th. Ample opportunity for practical instruction in the use of the gonioprism will be given and material from the glaucoma clinic will be utilized.

The course will be given by Dr. Daniel Kravitz, assisted by Drs. Mortimer A. Lasky, Nicholas P. Tantillo, and Samuel Zane. Registration is limited to six ophthalmologists only. Application and the fee of $50.00 may be addressed to—Dr. Daniel Kravitz, Brooklyn Eye and Ear Hospital, 29 Greene Avenue, Brooklyn 38, New York.

BUENOS AIRES COURSE

From November 23 to December 2 a postgraduate course on retinal detachment will be given at the Ophthalmic Section of the Italian Hospital, Buenos Aires, Dr. Jorge Malbran, chief. The course, which is limited to 15 ophthalmologists will be conducted by Dr. Enrique Malbran, Dr. Atilio Norbis, and Dr. Ricardo Dodds. Among the subjects to be presented are the pathogenesis of various types of detachment, sliplamp fundus biomicroscopy, the use of the Schepens binocular indirect ophthalmoscope, choice of surgical techniques, reoperation, diathermy, vitreous implantation, photocoagulation, and so forth. For further information write Dr. Enrique Malbran, Parera 94, Buenos Aires, Argentina.

COURSES AT MOUNT SINAI

The Mount Siani Hospital of New York City together with Columbia University is giving the following courses: "The use of the Schepens' ophthalmoscope" from March 10 to March 24, 1960, and "Histopathology of the eye" from April 6 to April 29, 1960. Complete information can be obtained from the Registrar for Medical Instruction, The Mount Sinai Hospital, 1 East 100th Street, New York.

SOCIETIES

PATHOLOGY CLUB

The first meeting of the Midwestern Section of the Ophthalmic Pathology Club will be on Saturday, January 16, 1960, in Iowa City. The meeting is open to anybody interested in ophthalmic pathology. For further details, please contact F. C. Blodi, M.D., University Hospitals, Iowa City, Iowa.

ASIA-PACIFIC ACADEMY

The first congress of the Asia-Pacific Academy of Ophthalmology will be held October 10 through 13, 1960, at the University of the Philippines Medical Center, Manila. The theme of the congress will be "Blinding diseases of the Asia-Pacific regions," and the official language, English. Those who wish to present free scientific papers during the congress should send the title and a brief abstract of no more than 200 words to Dr. William John Holmes, 280 Alexander Young Building, Honolulu 13, Hawaii, not later than February 1, 1960. Those interested in presenting movie films should notify Dr. Holmes by February 1, 1960, sending a brief explanatory remark on the subject of the film and indicating the size of the film and whether accompanied by sound, optical or magnetic. Projection time for each subject should be no longer than 30 minutes.

BROOKLYN OFFICERS

Recently elected officers of the Brooklyn Ophthalmological Society are: President, Dr. Ira W. Mensher; vice president, Dr. Edward Saskin; secretary-treasurer, Dr. Nicholas P. Tantillo; associate secretary-treasurer, Dr. A. Benedict Rizzuti.

CENTRAL ILLINOIS MEETING

The 33rd convention of the Central Illinois Society of Ophthalmology and Otolaryngology was

held at the Orlando Hotel, Decatur, September 18th, 19th and 20th. Among the speakers were: Dr. George J. Wyman, Peoria, "The use of alpha-chymotrypsin in cataract surgery"; Dr. J. Arthur Kerst, Springfield, "Ocular complications of chloroquin therapy"; Dr. Joseph A. C. Wadsworth, New York, the guest ophthalmic speaker, spoke on "Complications following cataract extraction," "Vitreous syndrome," "Tumors of the lid margins." Officers for the society are: President, Dr. William Hubble, Decatur; president-elect, Dr. G. E. Hartenbower, Bloomington; vice president, Dr. Edgar T. Blair, Springfield; delegate-at-large, Dr. LeRoy Porter, Urbana; secretary-treasurer, Dr. Clarence A. Fleischli, Springfield.

Penido Burnier officers

Officers for the 1959-60 season of the Associação Médica do Instituto Penido Burnier are: President, Dr. Alberto Gallo; first secretary, Dr. Alfredo Martinelli; second secretary, Dr. Guedes de Melo Neto; secretary-treasurer, Dr. L. de Souza Queiroz; committee for the archives: Dr. Antonio de Almeida, Dr. Gabriel Pôrto and Dr. Roberto Franco do Amaral.

Córdoba society

At the recent general meeting of the Sociedad de Oftalmología de Córdoba, the following officers were elected to serve during the 1959-60 season: President, Prof. Dr. Alberto Urrets Zavalía, Jr.; secretary, Dr. Claudio Juárez Beltrán; treasurer, Dr. Luis Mitnik; delegates, Dr. Juan Remonda and Dr. Dante Yadarola. All correspondence should be addressed to the president: Prof. Dr. Alberto Urrets Zavalía, Jr., Casilla de Correo 301, Cordoba, Argentina.

Personals

Executive director NSPB

Dr. John W. Ferree has been appointed to succeed Dr. Franklin M. Foote as executive director of the National Society for the Prevention of Blindness. Dr. Ferree, a native of Indiana, received his medical degree from Indiana University and was in private practice in his home state following a residency in internal medicine at Passavant Hospital, Chicago. He served as commissioner of the Indiana State Board of Health from 1940 to 1942. During World War II he was a commander in the Medical Department of the United States Navy.

Following service with the American Social Hygiene Association and the National Health Council, Dr. Ferree was, for 11 years, director of community service and education, and for two years associate medical director of the American Heart Association.

Dr. Franklin M. Foote whom Dr. Ferree succeeds served for nearly 13 years with the National Society for the Prevention of Blindness. He resigned in July to become Health Commissioner of the State of Connecticut. To this post, Dr. Foote brings a wide experience in public health work. From 1935 to 1942, he was in public health and school health work in Tennessee, Connecticut and New York. He served in the United States Army Medical Corps from 1942 to 1946 in which year he was appointed medical director of the National Society. He became executive director in March, 1947.

Dr. Foote has been treasurer of the Illuminating Engineering Institute since 1952 and a member of the board of directors of the National Health Council since 1955. He has served as secretary for the Western Hemisphere of the International Association for Prevention of Blindness; associate secretary and treasurer for Prevention of Blindness of the Pan-American Association of Ophthalmology; chairman of the Committee on Health and Safety of the Girl Scouts; consultant to the Surgeon General, United States Public Health Service, on glaucoma programs; chairman National Conference for Cooperation in Health Education; chairman School Health Section, American Public Health Association; president, New York State Academy of Preventive Medicine.

Dr. Foote is a member of the Section on Ophthalmology, American Medical Association, Association for Research in Ophthalmology, Inc., and the Committee on Industrial Ophthalmology of the American Medical Association.

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